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IT was something of a disappointment that the committee on headlights was not prepared to make a report. Aside from the general interest in the subject the matter is of importance because of the legislation that has been passed fixing certain minimum headlight powers and of the variations in the requirements of different states by which the operation of a road and some lines is variously affected. At least a full statement of the pros and cons of high and low power headlights should be made at the earliest opportunity in order that there may be on record a clear and clean-cut authoritative statement of the value of the various headlights for their intended purposes. Regardless of what that statement may be, it will be authoritative if it receives the sanction of the Master Mechanics' Association and could hardly fail to have an influence on state and federal enactments, and weight with the courts. On this basis it is to be desired that there should be a report of such a character that the whole headlight situation would be made clear, and that as soon as possible.

IF a daily paper is to be the echo of public sentiment, it is appropriate that the *Daily Railway Age Gazette* should be the echo of sentiment of the golden opinions won by Mr. Fuller, as the presiding officer of the Master Mechanics' Association. Comments on the admirable way he handled the convention have been widespread, and there has been a full appreciation of the skill with which he kept matters moving, and moving rapidly, from start to finish. Yet there was never the slightest appearance or suggestion of hurry. No one felt that his desire or ability to talk was curtailed, nor was the debate cut off until all had had full opportunity to be heard. On the other hand no time was wasted. The moment it was apparent that the last word had been said, a subject was closed and the next was speedily in course of presentation. Whether the presiding officer could foresee what was coming, information is wanting, but there seemed to be a balancing of subjects, either through skillful adjustment or manipulation, by which any encroachment on the time allotted to one subject by another was made up later, with the result that each day's work was finished on time and each committee had the satisfaction of having its report fully discussed. The beauty of it is that the presiding officer did not seem to have anything to do with it, and that matters appeared to flow on smoothly without any interference or even guidance on his part. But to those who watched it was evident that there was a steady, though almost unseen, hand at the helm. Mr. Fuller won laurels and touched a high point as a presiding officer.

WE often hear of locomotive repair plants being remodeled or extended to take care of increased business. Usually the machine, erecting or boiler shops are the ones which are most greatly in need of this. Very seldom is it true of the blacksmith shop. The reason for this must be credited largely to the introduction of forging machines in recent years. The home-made bulldozer was first introduced by some of the more progressive foremen. It was followed by the forging machine, but for quite a period very few foremen seemed to comprehend how it could be used to the best advantage. The secret of the success of these machines finally proved to rest almost entirely in the amount of ingenuity possessed by the man who had charge of designing and making the dies; and at the present time really wonderful results are being obtained, the most intricate pieces often being formed at one heat and in a single operation. In some cases the manufacturer has been agreeably surprised to find a railway doing work of the machine. A good forging machine supplied with a proper furnace will, on the average, do the work formerly requiring 12 fires, with a smith and helper at each. It is little wonder, then, that in most cases the smith shop has remained undisturbed while the other departments have had to be extended.

THE three reports on contour of tires, on specifications for tires, and on flange lubrication, were properly grouped together on the programme, as they are in a measure interrelated. All have to do with tire wear, and particularly with the expense for tire maintenance and renewal. As to the form of contour for locomotive driving tires, it is not at all certain that this should be the same as the M.C.B. 1909 standard, which the report recommends. The discussion developed some very sound objections to it, particularly on the matter of expense for turning off so much steel for the tapered tread which might be better utilized in rendering further service. The short flange, 1-in. deep, with rounded end, should assist the manufacturer in the rolling of tires which do not develop

cracks at the point, as the sharper and deeper flange does frequently. A flange only 7/8-in. deep, has been used successfully by some lines while others cannot use it on account of derailment. This indicates that tire practice in this and several other respects depends on local conditions, and it may not be wise or profitable for all lines to adopt the one standard contour as recommended by the committee. It is claimed for the taper of tread of one in twenty that it causes the wheels to run with flanges away from the rail and thus prevents excessive flange wear, and this may generally be true; but it is not necessarily the most economical practice for some roads. The excessive taper of the tire rim does not seem to be always desirable in returning tires, as a flatter section would give longer service, and good practice with driver brake shoes should prevent the formation of double flanges. The tire rim, instead of being turned off by the lathe, should be utilized in furnishing metal for the wear due to brake shoes. The preliminary specification for steel tires presented is a very good one and properly includes a destructive drop test, a feature which has been in use for many years by foreign railways, but for some reason has never come into use here. This destructive test need not be generally used, but by making it one of the requirements in an occasional large order would doubtless result in valuable information for the manufacturer and assist him in improving the quality of tires. The report on flange lubrication is an admirable one, which will advance a practice sure to accomplish large economies in tire maintenance. It does not refer to the liability of lubricating the top of the rail and thus reducing adhesion of drivers, a matter which is quite possible with the careless use of flange lubricators and one which should be prevented by proper rules and careful practice.

THE discussion yesterday regarding locomotive boiler inspection and safety appliances manifested clearly the strong desire that railway officers have to co-operate with the officers of the state and national governments in carrying out the laws that have been enacted for the regulation of these matters. There were almost no expressions of discontent because the policy of regulating railway mechanical affairs has been adopted. A feeling was shown, however, that the new legislation has put railway officers in a trying position. There is always difficulty in adjusting any industry to a new form of governmental control; and the difficulty in the case in question has been enhanced by the fact that neither the requirements of the states nor of the nation are thoroughly understood, and that in not a few instances they are inharmonious or conflicting. In these circumstances it is to be hoped that the government officials will deal with the situation in the same spirit in which the railway officers are disposed to meet it. All the rough places can be measurably smoothed over if all the interested parties will approach the subject with a disposition to secure nothing more, less nor other than the result that the laws are designed to accomplish, viz., the increase of safety in transportation. If we may judge from all that is being said and done by railway men, there is absolutely no disposition on their part now either to resist or to the slightest degree to evade these statutes. And if there shall be shortcomings in their compliance with them they will probably be chargeable to defects in the laws themselves or to misunderstanding of them; and these things furnish reasons for further conference between them and the officers of the government, not for setting in motion the machinery of the courts.

FOR the second time within three years an English-born president has been selected to head the Master Mechanics' Association. H. T. Bentley, assistant superintendent motive power of the Chicago & North Western, who was elected to fill that position yesterday was born in London, England, in 1863, and was educated at Dulwich College, near London. In 1877 he entered the service of the London & North Western at Crewe, England, as an apprentice under F. W. Webb, who at that time was chief mechanical superintendent. H. H. Vaughan, who was president of the association in 1908-9, was also born in England, at Forest Hill; he was educated at King's College, and was employed by both the Manchester, Sheffield & Lincolnshire and the London & South Western before coming to this country. Mr. Bentley remained at Crewe as an apprentice and journeyman for ten years and was then promoted to shop foreman of the locomotive department at the Chester shops of the same road. In the fall of 1892 he came to this country and entered the employ of the Chicago & North Western. He worked in the Chicago shops for ten days and was then sent to take charge of the enginehouse at Boone, Iowa. In 1895 he was promoted to general foreman, in charge of the shops and enginehouse at Belle Plaine, Iowa, and in 1898 he was made general foreman of the Clinton, Iowa, shops. His next promotion was to the position of master mechanic, in charge of the Madison division, with headquarters at Baraboo, Wis. His splendid work on this division resulted in his being placed in charge of the largest division on the road—the Iowa division—with headquarters at Clinton, Iowa, on January 1, 1900. Two years later, in 1902, he was made assistant superintendent motive power, with office at Chicago, which position he now fills. That he has remained so long with the Chicago & North Western is not because he has not received the most flattering offers from other roads, but because that road has made an extra effort to make him stay. Mr. Bentley has a kind and genial disposition and at the same time is a man of force. This, combined with a goodly supply of tact, is responsible for his success in getting along with men and of having them measure up to their responsibilities and requirements. His success is also due in a large measure to the fact that he enjoys detail and goes into things thoroughly before making a decision. This does not prevent him from dispatching his work quickly. His ideals are extremely high, and, as Mr. Quayle says, "he would rather be right than president." The association is fortunate in securing just at this time, which in many respects promises to be a most critical period in the life of the association, a man so well equipped, both by experience and personality to take the leadership. The *Railway Age Gazette* joins heartily in wishing him a most successful and fruitful administration.

THE RAILWAY AS A MANUFACTURER.

AT the recent meeting of the Railway Storekeepers' Association at Milwaukee, in addition to other papers of more especial interest to the stores department, five papers on the general topic of "The Railway as a Manufacturer" were read. It is instructive to find that not one of the authors favored the railway being a manufacturer. The storekeepers themselves have been responsible for the manufacture by railways of numerous small articles which they could get promptly when needed, but the writers of these papers all said that it is bad practice and not often economical. Others in the stores department and in the mechanical department may not agree with this, and may favor the manufacture in the railway shops of many articles which are specialties in the trade.

On most railways the number of these shop-made articles could be reduced, and the list should be gone over systematically by the store and mechanical departments with the object of determining accurately what items can be made to advantage by the railway and what should be purchased from the regular manufacturer. This would result in a more careful scrutiny of the cost of manufactured articles, and a standing committee of the Railway Storekeepers' Association should report from time to time on articles which should be dropped from the list.

Conditions are constantly changing and always in the direction of the production of more specialties by intensified and economical methods of manufacture with which the railways are not familiar and which, for obvious reasons, they do not and cannot use. At one time it was necessary for railways to make some fixtures because they were not made of proper grade in

the industrial factories, but today most of them are made better and cheaper than they can be produced by the railway repair shop. The railway wheel foundry and iron foundry are almost things of the past, and the brass foundry is becoming a less important adjunct than it formerly was. Brass goods, valve checks, cocks, injector parts, air brake parts and the brass trimmings for passenger cars can all be produced by the ordinary factory much cheaper than by the railway shop, and if the railway can buy them even at the same cost as they can make them themselves it is good policy to do so.

The prevailing opinion among the storekeepers is that, almost without exception, any article made in railway shops today can be bought for the same cost elsewhere. Only such material as is required in small quantities and can be handled satisfactorily with ordinary shop facilities should be made in the repair shop, and when any commodity can be obtained from the manufacturer at a reasonable cost it is more economical to purchase it.

In the making of tinware, piston packing, locomotive and car springs, crank pins, etc., the railway cannot compete with concerns which make a specialty of manufacturing such articles, and there are few things used by railways in the economical production of which the manufacturer does not have the advantage. Two things have contributed to bringing about this condition: First, the growth and development of factories and factory methods; second, the increase in the number of cars and locomotives on every line to such an extent that under normal conditions of traffic the shops are fully occupied in maintaining the equipment. The managers are urging the master mechanics and shop superintendents to bend their energy toward a greater output of repaired cars and locomotives, and they do not find spare time to properly attend to the manufacture of miscellaneous materials for store stock. They do not, therefore, have the same interest in manufacturing and would prefer that such supplies be purchased, so that the shop is relieved of that amount of work and the time and attention is given to equipment repairs.

Unless the manufacture of miscellaneous supplies is placed on a factory basis and kept separate from repair work, it cannot be done so cheaply as to compete with the manufactory, and it interferes in many ways with the course of repairs through the shop. The manufacture of complete locomotives or cars is a larger question, which has been already decided by most lines, which have abandoned such work; but it still can be carried on to a limited extent by larger shops where it is desirable to retain a supply of well-trained skilled mechanics, who would always be available when there is a rush for repair work. At the smaller shops labor conditions are often such that it is found best to employ as few men as is actually necessary for repairs, and this precludes the possibility of any new construction work.

Taking the question in general, as applied to the average railway repair shops, the tendency is more and more toward the purchase of most supplies, and it is fortunate that when these shops are so fully occupied with their proper and legitimate work that it is now possible to purchase many miscellaneous supplies, formerly made in the shop, with prompt delivery and at satisfactory prices.

TODAY'S AND SUNDAY'S PROGRAMS.

SATURDAY.

Band Concert, 10.30 A. M.—Entrance Hall, Million Dollar Pier.

Base Ball Parade, 2.00 P. M.—Million Dollar Pier to special trolley cars.

Base Ball Game, 3.00 P. M.—East v. West, Pennsylvania Railroad Company's Inlet Park Base Ball Grounds. Free trolley cars for those wearing the official badge. Music by Railway Supplymen's Band.

All Star Vaudeville Show, 9.00 P. M.—At Apollo Theatre. Direct from Keith & Proctor's Fifth Avenue Theatre, Percy G. Williams' Colonial Theatre, Hammerstein's Victoria Theatre, New York City.

SUNDAY.

Concert by Marlborough-Blenheim Orchestra in Blenheim Exchange, 11.00 A. M.

Prelude and Intermezzo from "Cavalleria Rusticana" *Mascagni*
The Last Hope *Gottschalk*
Grand Fantasie, "Carmen" *Bizet*

CELLO SOLO

Nocturne *Chopin*

MR. LEO SACHS

a Humoreske *Dvorak*
b The Lost Chord *Sullivan*

VIOLIN SOLO

Paraphrase, "Die Meistersinger" *Wagner*

MR. J. KINSBERGER

Fantasie, "Rigoletto" *Verdi*
Ave Maria *Gounod*

Concert by Marlborough-Blenheim Orchestra, in Blenheim Exchange, 8.00 P. M.

Overture, "William Tell" *Rossini*

PIANO SOLO

Fantasie, "Faust" *Gounod-Liszt*

MR. HENRY GRUHLER

Fantasie, "Tannhauser" *Wagner*

CELLO SOLO

Hungarian Rhapsody *Popper*

MR. LEO SACHS

Meditation from "Thais" *Massanet*

VIOLIN SOLO

Gypsy Airs *Sarasate*

MR. J. KINSBERGER

American Fantasie *Herbert*

THE RECLAIMING SCRAP MATERIAL COMPETITION.

The success of the competition on Reclaiming Scrap Material, which has been announced in the Shop Section of the *Railway Age Gazette* to close July 15, promises be one of the most successful competitions yet held judging from the number of those who have dropped in to say that they expected to send in contributions.

ENROLLMENT COMMITTEE ANNOUNCEMENT.

Chairman Ostby has arranged to open the enrollment booth on Sunday, between 11 A. M. and 1 P. M., and from 4 to 7 P. M. This will give those who arrive on that day an opportunity to register.

On Saturday the hard workers on the committee will take a half day off to see the ball game. The booth will be open only from 9 A. M. to 1 P. M.

MAIL DISTRIBUTION.

Secretary Conway has arranged to deliver all mail addressed to the pier, so that hereafter it will be unnecessary for members of the Railway Supply Manufacturers' Association to call at his office.

RAILWAY CLUB SECRETARIES.

Members of the Society of Railway Club Secretaries are again reminded of the annual meeting which will be held at the Hotel Brighton, Saturday morning at 10 o'clock. The annual dinner will be held in the garden of the Hotel Windsor at 7.30 in the evening. If the weather is unfavorable it will be held inside.

VAUDEVILLE ENTERTAINMENT: SPECIAL NOTICE.

The entertainment committee wishes to remind members and guests that admission to the Vaudeville at the Apollo Theatre to-night will be by *official badge only*, and it is urgently requested that badges be worn in *plain sight*.

Don't forget your badge; it is your ticket.

TO-DAY'S BALL GAME.

The annual ball game in connection with the conventions will be played at the Pennsylvania Railroad's Inlet Park grounds this afternoon at 2 o'clock.

The parade will be formed at the entrance to the million Dollar Pier at 2 P. M., and will proceed from there to New York avenue, where trolley cars will be provided to take the entire crowd to the grounds. The parade will be led by Mayor Stoy and the chief of police, and will be composed in addition as follows:

Eight police officers.

Base ball band.

Base ball teams.

Girl rooters for east and west, with their cheer leaders.

Members of the conventions' associations, ladies and guests in roller chairs and on foot.

The teams will be composed as follows; they will bat in the order in which their names are given:

EASTERN TEAM.

Third base, Clifford Beaumont (B. & O.), Baltimore, Md.

Short stop, Leonard J. Hibbard, Leonard J. Hibbard Co., New York City.

Second base, T. P. O'Brian, O. M. Edwards Co., New York City.

Center field, B. K. Stephenson, Griffin Wheel Co., Boston, Mass.

First base, George Wildin, Mech. Supt., N. Y. N. H. & H., New Haven, Conn.

Right field, Frank Martin, Jenkins Brothers, New York City.

Catcher, Harvey C. Oviatt, Gen. Insp., N. Y. N. H. & H., New Haven.

Left field, F. M. Nellis (captain), Westinghouse Air Brake Co., Boston, Mass.

Pitcher, C. A. Jeffrey, Baltimore & Ohio, Baltimore, Md.

Substitutes—George H. Nichol, Johns-Manville Co., Baltimore, Md.; Charles Gilman, Q. & C. Co., New York City; Henry B. Bradford, Westinghouse Air Brake Co., Boston, Mass.

WESTERN TEAM.

Short stop, Jas. E. Tarleton, Union Draft Gear Co., Chicago.

Third base, Sheldon C. Potter, Reliance Electric and Eng. Co., Cleveland.

Second base, Stanley W. Midgley, Curtain Supply Co., Chicago.

Center field, Neil W. Snow, Detroit Twist Drill Co., Detroit.

First base, Harry S. Hammond (captain), Pressed Steel Car Co., Pittsburgh.

Left field, T. O. Sechrist, M. M., C. N. O. & T. P., Somerset, Ky.

Pitcher, C. S. Schwartz, St. Louis Refrigerator Car Co., St. Louis.

Catcher, Geo. Gallinger, Independent Pneumatic Tool Co., Pittsburgh.

Right field, Adam La Mar, Penn., Fort Wayne, Ind.

First base, J. F. Strieb, Pressed Steel Car Co., Pittsburgh.

Right field, Wm. H. Allen, C. H. Besley & Co., Chicago.

Third base, J. H. Nash, Illinois Central, Burnside, Ill.

Second base, I. S. Downing, M. C. B., L. S. & M. S., Cleveland.

Right field, B. H. Forsyth, Ford and Johnston, Michigan City, Ind.

Left field, Wm. Wilson, Flannery Stay Bolt Co., Chicago.

Harold E. Oviatt, mascot eastern team.

Charles E. Fuller, Jr., mascot western team.

——— Steele, mascot eastern team.

Harry Fuller, cheer leader, western team.

H. E. Passmore, T. & O. C., umpire, west.

W. E. Cade, Franka Barbey Co., umpire, east.

The official score card keepers will be Louis Pelletier, *Machinery*, and Harry O. Fettinger, Clement Restein Company.

The make-up of the mysterious base ball band—mysterious now no longer—will be as follows:

J. Will Johnson (leader), Pyle National Electric Headlight Co., cornet.

Charles J. Pilliod, Pilliod Brothers Co., B♭ clarionet.

Mark A. Ross, Pyle National Electric Headlight Co., cornet.

George W. Bryant, Thos. Prosser & Son, alto.

W. E. Sharp, Armour Lines, alto,

W. W. Rosser, T. H. Symington Co., bass.

Jos. W. Taylor, secretary M. C. B. and M. M. Associations, baritone.

Fred M. Nellis, Westinghouse Air Brake Co., slide trombone.

C. W. Bird, Jenkins Bros., snare drum.

F. L. Gault, Nathan Mfg. Co., slide trombone.

Joseph Violande, Crane Co., bass drum.

Philip Sreda, American Arch Company, E clarionet.

There will be two teams of rooters, composed of 20 ladies, 10 representing the west and 10 the east, and each team will be inspired to greater efforts by the cheers of these rooters, who will be led by cheer leaders. The rooter team for the east will be seated on the right of the grand stand, facing the grounds, the rooters from the west on the left of the grand stand, and the band in the center.

The committee in charge of the game is composed of Charles M. Knill, Chas. H. Besly & Co., chairman; Fred M. Nellis, Westinghouse Air Brake Co.; Harry S. Hammond, Pressed Steel Car Co.; Thomas Farmer, Jr., Consolidated Car Heating Co.; Herbert Green, Burton W. Mudge & Co.; W. S. Furry, Ohio Injector Co., and Frank Martin, Jenkins Bros.

VAUDEVILLE AT THE APOLLO THEATRE TO-NIGHT.

An all-star vaudeville show will be given to-night at the Apollo Theatre, on the Boardwalk, between New York avenue and Kentucky avenue, for persons attending the Conventions. The players will be direct from Keith & Procter's Fifth Avenue Theatre in New York, and are said to constitute the strongest group of vaudeville players ever got together for entertainment of this kind. Admission will be by badge. The show will begin at 9 P. M. The program will be as follows:

1. Overture—Orchestra, direction of Henry Conrad.

2. Rice, Sully and Scott, Original Eccentric Comedians.

3. The Courtney Sisters, introducing a somewhat different Singing Act.

4. Howard, the Scotch Ventriloquist, in a Comedy Sketch entitled "A Visit to the Doctor's Office." Cast: McGregor, by himself; Jimmy, by himself; The Doctor, Howard.

5. E. Frederick Hawley, Frances Haight and Company, in the dramatic playlet, "The Bandit." Cast: Cochiso Ramando, the Bandit King, E. Fred. Hawley; Jose Travenia, his Body Servant, A. McKaskill; Marie, the Captive, Miss Frances Haight; period, 1870; season, fall; time, morning.

6. Jack Wilson, the Inimitable Comedian, assisted by Miss Ada Lane and Franklyn Beattie in "An Upheaval in Darktown."

7. "Top o' the World" Dancers and the Original Famous Collie Ballet in A Dancing Novelty. Cast: The Doll Princess, Vivian Ford; Peppermint Kid, Harry Ali; Jack in the Box, Bobby Nolan; The Polar Bear, Harry Hewitt; Kris Kringle, Dixie Kirkland; Dancing Boys, Bobby Nolan, Harry Ali, Dixie Kirkland, Walter Burke; Dolls, Jean Barnett, Goldie Stover, Marie Savage, Olga Fayette, Mable Burke, May Lane, Gertrude Rutledge, Grace Townsend; Collie Ballet, Goldie Stover and Sunny Jim, Jean Barnett and Snow Boy, May Lane and Bebe, Marie Savage and Tip, Olga Fayette and Collo, Gertrude Rutledge and Frost King.

Proceedings.

President Fuller called the third and final session of the Master Mechanics' Association to order at 9.30 Friday morning. The Auditing Committee reported that the books and vouchers of the Secretary-Treasurer were correct.

SAFETY APPLIANCES.

The committee on safety appliances has carefully considered this important subject in the limited amount of time that it has had since the issuance of the order of the Interstate Commerce Commission in the matter of United States Safety Appliance Standards, dated March 13, 1911, which is a modification of the original order issued October 13, 1910. The United States Safety Appliance Standards prescribed in the Interstate Commerce Commission's order of March 13, 1911, must be applied to all equipment built on or after July 1, 1911. As to applying the United States Safety Appliance Standards prescribed in the Interstate Commerce Commission's order of March 13, 1911, to equipment built prior to July 1, 1911, the order of the commission prescribes the following:

"Carriers are granted an extension of one year from July 1, 1911, to change switching locomotives to comply with the standards prescribed in said order.

"Carriers are granted an extension of two years from July 1, 1911, to change all locomotives of other classes to comply with the standards prescribed in said order."

The committee then inclosed the standards prescribed by the commission, with which railway men are already familiar.

The matter of appending to this report drawings or cuts showing the manner of application of these safety appliances was considered by the committee, but owing to the various local conditions and practices to be met by the various railways of the country in applying these standards, and also to the limited amount of time in which to gather the requisite information since the issuance of the final order of the Interstate Commerce Commission, the committee has not prepared drawings or cuts.

The report is signed by:—Theo. H. Curtis (L. & N.), chairman; M. K. Barnum (I. C.) and C. B. Young (C. B. & Q.).

Mr. Curtis (Chairman of committee): Referring to the Interstate Commerce Commission standards for steam locomotives in road service and the location of the sill steps, there have been a great many questions asked as to where the roads are going to place this sill step. The order is very plain that it must be outside of the rail, and not over 16 in. above it. It may be placed on the face of the bumper beam, or it may be placed on the rear of the bumper beam, or it may be placed on the pilot; so long as it is outside of the rail and not over 16 in. above the rail, it complies with the law. There are some railways that use this step entirely, where the clearance will permit it, on the rear of the bumper beam. Other railways use it and have the same attached to the pilot. Some are applying it on the face of the bumper beam. I wish to call your attention to the fact that this sill-step is to have a metal tread 8 in. by 10 in. It says it also may have a wooden tread. My interpretation of this is that sill step must have a metal tread. If you wish to put a wooden tread on top of it you can.

The pilot beam handholds and rear-end handholds for steam locomotives in road service are to be 5/8 in. in diameter with a minimum clear length of 14 in., preferably 16 in., and minimum clearance of 2½ in. The end handhold for steam locomotives used in switching service must be 1 in. in diameter, with 4 in. clearance, except at coupler casting or braces, when minimum clearances shall be 2 in. Under the location we learn that this handhold shall extend across the front end of the locomotive, in the rear of the tender. You will note that the road engine has a different handhold from the switch engine. There is nothing said in the order as to when the road engine becomes a switch engine, but it is reasonable to understand that a road engine could not switch too long and not become a switch engine; therefore it becomes almost necessary to equip your road engine as a switch engine in order that you may transfer a road engine to switch engine service. The handholds on a switch engine would be permissible on a road engine, but the handholds on a road engine would not be permissible on a switch engine.

The important feature of the end clearance is the 14 in. from the vertical plane passing through the inside face of knuckle when closed with the horn of coupler against buffer block or end sill. There are exemptions made for air hose, steam hose and different appliances, but there are no exemptions made for bolt heads, rivets or push pole pockets. Therefore the matter stands about like this: There are 14 in. required by law; about half an inch will have to be added for contingencies, 3 in. will need to be added for push pole pockets and other parts of the tender that are not exempt, and 2 to 3 in. clearance must be added for compression of the spring, making a total distance of about 20½ in. from the end sill to the inside of the knuckle. Now, this is a very long overhang to maintain on a switch engine. Especially is this so when it is required on a switch engine, and a road engine may be made a switch engine almost momentarily. So it becomes practically necessary to equip a road engine with a very long distance between the knuckle and the end sill. With this long overhang, or distance, we begin to have some more trouble. The uncoupling lever arm will be very long. it may be 15 to 18 in. long. In fact, it is so long that it is very hard to lift the knuckle. This uncoupling apparatus must extend near the full width of the tender; there is very little allowance left. There is nothing said in the law as to the length of the arm on the outer end of the uncoupling lever as it applies to locomotives, but there is as applied to cars. It is open to reasonable interpretation that this lever must not be too long. If it is too long, when the trainman on one side of the tender or pilot raises the uncoupling lever the long handle will stick out on the other side and perhaps injure a fellow-trainman.

These difficulties must needs be obviated after a very careful study of this safety appliance question and after, I might say, a conference of your best men in an endeavor to ascertain how it can be applied to your locomotives. I have held several of these conferences with the officials of the road with which I am connected, and we feel that we have learned a great deal about the application of safety appliances, but we believe there is still much more to learn.

DISCUSSION ON SAFETY APPLIANCES.

The President:—A serious question in connection with this subject is the length of the draw bar head to obtain the 14 in. clearance, especially on the rear of the tender where you have been using the M. C. B. standard coupler. You have either got to lengthen out the head, or you have got to move the draw bar and draft rigging out, and I think we ought to arrive at an understanding of the best method of taking care of this clearance, with as few couplers as possible. In interchange work, this question does not enter into that, but there is no necessity of perpetuating a dozen couplers if two or three will answer the purpose.

W. E. Dunham (M. P. & M.):—The Committee on Standards of the M. C. B. Association had this matter under consideration, and the committee was informed that a Special Coupler Committee of the M. C. B. Association was figuring on a longer head to take care of this clearance.

G. W. Wildin (N. Y. N. H. & H.):—That is what the Coupler Committee will report at the Association meeting next week, and I think that whatever action is taken by that association will apply so far as the length of the coupler is concerned to the switching locomotive as well as the cars. The only thing that is troubling the committee is to get some idea as to how many standards will be necessary. We have not been able to get the information from the various roads as to their clearances. Until we do have that information we shall be unable to sum up and say how many standards there will necessarily be.

C. A. Seley (C. R. I. & P.):—In regard to fitting up of our equipments to meet these requirements, my thought is that the switch engines should be considered first, for the reason we must have them equipped within a year, to comply with the law; and then comes about the idea that road engines are used in switching service very extensively, and while we have two years on them, we ought not to neglect the thought that possibly switch engines and road engines should have the same equipment. I am referring to the end handholds particularly. Probably what we shall do will be to put stands on the ends of the buffer beams 6 in. apart, to receive a piped handhold pinned to these stands, with an opening in the center for the uncoupling frame, and have the uncoupling lever inside the pipe. It makes a very neat arrangement. So far as I can construe the law it will fulfill the law. It is applicable both to switch and road engines, and so far as we had the thing figured out when I came away, that is about where it will land if we do not change our mind. That is my thought up to the present time. The fitting up of road engines so as not to make a violation under the heading which is used in these rules, not "switching engines," but engines used in switching service, is pretty

broad, and I do not know whether we could plead temporarily as a bar to that, so I think it is very important, indeed, that the road engines be fitted up on the switch engine lines in so far as handholds and clearances are concerned. We have found considerable advantage in our design of front ends of switchers on account of having a tapered buffer beam, that is a bowed front, which gives us better clearance out where the man stands in relation to the coupler lengths than where you have a straight design.

J. H. Manning (D. & H.): I think it would be a serious mistake on the part of this association to introduce another M. C. B. coupler to take care of the end clearance on locomotives as well as cars. I think there is no doubt but that the yoke can be lengthened out and the filler put in to meet all requirements. We do it now. Where the springs are used or friction gear, the yoke can be lengthened, and where the nigger head is fastened onto the back of the end sill, a liner can be put behind it. I do not think that what we do with that matter will have much practical effect, as far as the locomotive ends are concerned. The chances are that each road will adopt its own ideas in complying with the law. I presume the Committee on Standards of the M. C. B. Association will have something to say as to how to meet the conditions on the cars.

Mr. Seley: I might have added it is our intention in a number of designs to put in a filler and lengthen out in that way.

Oliver C. Cromwell (B. & O.): I believe it is advisable to keep down the number of couplers which are used on our wooden tender frames. I do not see how it is going to be possible to use our M. C. B. type coupler without cutting away the end sills entirely. You will have to fill it out to give the end ladder clearances. You might take care of that on a steel underframe, but when you come to a wooden one, you will not be able to solve it, as I can see, in that way. I am afraid we will have to look towards making a longer shank, but the draw bars will not have sufficient support to hold up the coupler, if we carry our carrier out towards the coupler. I did not realize it would require quite so much over hand as the Chairman has shown us. We can take care of that part on the new locomotive, but the older ones are those which will give us trouble. I would like to add to the remarks of Mr. Seley that it would be of great importance to fit out both the freight and the switcher locomotive tenders in the same way because they do get into the same service. I believe we are all here willing to listen to suggestions on this matter, because we have not had much time to solve the problem as yet. I believe it would be well if this subject was thoroughly threshed out on the floor.

Mr. Curtis: In regard to the coupler, whether the head shall be made longer or the shanks shall be made longer, I have had considerable experience so far in this matter. We have endeavored to keep the switch engine with the M. C. B. coupler, with the 9 in. head; that is 9 in. from the coupler horn to the inside face of the knuckle. It required 8½ in. in the buffer block to hold the coupler up. We had to cut the end sill nearly in two to get the yoke of the coupler to come up far enough to allow any action of the spring; and when we looked upon our work we were not satisfied with it, it did not look well. Then we purchased a coupler that had a head 13½ in. from the coupler horn to the inside face of the knuckle. It is the cheapest way to handle the subject. This head was placed in the tender without any change whatever except removing the old M. C. B. coupler and applying a new coupler without a name. This coupler looks bad; the overhang is immense to a man that is accustomed to a close coupled engine, but of the two I think the change of the coupler is by far the better. I take this view from the experience I have had in having equipped engines both ways.

F. C. Chambers (C. of N. J.): With reference to the push pole pocket, I would say that there is a way of getting around that, namely, the pocket may be depressed so that it will be flush with the sill. On wooden end sills we have fitted up a few that were depressed, and have put in simply a steel plate forming a pocket in it, which was only ⅝ in outside of the face of the sill. We took up the matter directly with the Interstate Commerce Commission about the curve line of the uncoupling handle, which stuck out say 4 in. They passed upon that as not being a matter considered in the Act, but that it was taken in the exception that was made with respect to the coupling lever arm. We had a cast iron push pole pocket on the same end sill that did not stick out as far as this coupler handle did, but I did not bring that before the Commission; I thought I would wait a little while as I did not care to take it up with them, although I could not see what difference it made when it was outside of the handle, and both were outside of the step on the rear. My idea was that they would not accept that exception. By countersinking a push pole pocket in the end sill 3½ to 4 in. of that overhand can be eliminated, and it is the overhang, as mentioned by Mr. Seley, that would be decidedly objectionable.

Mr. Seley:—The Special Committee which has had to do with the handling of these matters to a considerable extent, and also the Conference Committee, composed of members of this Association, have been discharged in so far as any connection with the legislation end of the matter is concerned. It is now up to this Association, as you probably noticed in the President's address, to take care of the details, the technical matters. I do not know how the Executive Committee can handle that matter, but I can see how members can make it pretty hard for the fellows who are on that committee to try and interpret the law. Try to interpret the law for yourselves; do not ask somebody else to do it. I hope our membership will realize the burden that has been put, and possibly may be put, on any one who has to do with handling matters of this kind, and lighten it as much as possible by not asking such general questions.

W. E. Dunham (M. P. & M.): In connection with this 8 in. x 10 in. length of step, I would inquire whether that refers to the shape of the step crosswise of the truck or lengthwise of the truck?

Mr. Curtis: The step can be put on either way so long as it is 8 in. x 10 in. The ladder may be placed anywhere on the rear of the tender. At the conference with the inspectors at Washington that matter was discussed, and it was thought preferable to have it at the side of the tender, so that it would not interfere with a man going up the ladder when the tender was coupled to a car that had a vestibule. A tender does not require a hand brake when coupled to a locomotive, but if you ship that tender in a train then it will be necessary to put a hand brake on it, as it then becomes a car. You will notice that a variation of 5 per cent. is allowed for manufacture and wear. This must not be taken as a permission to reduce the size of the material when applied to the minimum. That is, when it calls for a ⅝-in handhold bar, iron nominally ⅝ in. diameter could be used. You should not use a bar, however, that is 5 per cent. under ⅝ in. If you do so, as soon as there is any wear upon it you are subject to the fine for operating a locomotive with a safety appliance under the size prescribed by-law.

DESIGN, CONSTRUCTION AND INSPECTION OF LOCOMOTIVE BOILERS.

C. A. Seley (chairman of committee): The committee is unable to present a written report on account of the late date of the promulgation by the commission of the boiler inspection rules.

Last year, due to legislation in Congress, it was thought wise for the association to put itself on record, so far as it could out of convention, in regard to getting out a set of rules covering minimum requirements of boiler inspection. The committee met and got out such a set of rules, and sent them out in a circular dated September 8, 1910.

These rules were submitted to the membership. They concluded with a request for an informal ballot to get the mind of the Association, and they were carried practically unanimously, the negative votes being insignificant in number. These rules were brought to the notice of those handling the legislation, and, after the law had been passed the railways were invited by the chief boiler inspector to send representatives to a conference at Washington to discuss the matter of the rules, and a Conference Committee of mechanical officers—appointed as a sub-committee of the Special Committee on Relations of Railway Operation to Legislation—discussed the matter with the inspectors and the representatives of the employees, arriving at a set of rules with which you are probably familiar through Bulletin No. 17 of the Special Committee, which has also been published in the *Railway Age Gazette*, May 12, page 1105. Those rules were revised and finally acted upon at a hearing before the Interstate Commerce Commission on May 29 and were issued, with the ruling of the Commission, under date of June 2, 1911, and they have been distributed to the railways.

This ruling of the Commission and the rules which have been materially changed from those in the above-mentioned Bulletin No. 17, are given as follows:

Whereas the fifth section of the act of Congress approved February 17, 1911, entitled "An act to promote the safety of employees and travelers upon railroads by compelling common carriers engaged in interstate commerce to equip their locomotives with safe and suitable boilers and appurtenances thereto," provides, among other things, "that each carrier subject

to this act shall file its rules and instructions for the inspection of locomotive boilers with the chief inspector within three months after the approval of this act, and after hearing and approval by the Interstate Commerce Commission, such rules and instructions, with such modifications as the commission requires, shall become obligatory upon such carrier: *Provided, however,* That if any carrier subject to this act shall fail to file its rules and instructions the chief inspector shall prepare rules and instructions not inconsistent herewith for the inspection of locomotive boilers, to be observed by such carrier; which rules and instructions being approved by the Interstate Commerce Commission, and a copy thereof being served on the president, general manager, or general superintendent of such carrier, shall be obligatory and a violation thereof punished as hereinafter provided;" and

Whereas at the expiration of the period of three months after the approval of said act many of the common carriers subject to the provisions thereof had failed to file their rules and instructions for the inspection of locomotive boilers with the chief inspector; and

Whereas the chief inspector thereupon proceeded to prepare for submission to the Interstate Commerce Commission for its approval rules and instructions for the inspection and testing of locomotive boilers and their appurtenances for such carriers so failing to file the same; and

Whereas upon due notice there came on a hearing before the Interstate Commerce Commission in the matter of the approval and establishment of the rules and instructions prepared by the said chief inspector, on the 29th day of May, 1911; and

Whereas such carriers as had filed their rules and instructions for the inspection and testing of locomotive boilers and their appurtenances with the chief inspector within three months after the passage of said act asked, through their representatives at said hearing, that such of said rules and instructions which did not fulfill the requirements of the proposed rules and instructions prepared by the chief inspector be modified to the extent necessary to conform thereto, and that such of said rules and instructions as prescribed a higher standard than that required by the rules and instructions prepared by the chief inspector be regarded as withdrawn from consideration, and joined in a request that such rules and regulations as had been prepared by the chief inspector and approved by the Interstate Commerce Commission be established with uniformity for them and all other carriers subject to the act; and

Whereas at the hearing aforesaid the rules and instructions prepared by the chief inspector were submitted to the Commission for its approval and all parties appearing at said hearing were fully heard in respect to the matters involved, and said proposed rules and instructions having been fully considered by the Commission:

It is ordered, That said rules and instructions for the inspection and testing of locomotive boilers and their appurtenances, as follows, be, and the same are hereby, approved, and from and after the 1st day of July, 1911, shall be observed by each and every common carrier subject to the provisions of the act of Congress aforesaid as the minimum requirements: *Provided,* That nothing herein contained shall be construed as prohibiting any carrier from enforcing additional rules and instructions not inconsistent with the foregoing, tending to a greater degree of precaution against accidents:

Flues to be removed.—All flues of boilers in service, except as otherwise provided, shall be removed at least once every three years, and a thorough examination shall be made of the entire interior of the boiler. After flues are taken out the inside of the boiler must have the scale removed and be thoroughly cleaned. This period for the removal of flues may be extended upon application if an investigation shows that conditions warrant it.

Method of testing rigid bolts.—The inspector must tap each bolt and determine the broken bolts from the sound or the vibration of the sheet. If stay-bolt tests are made when the boiler is filled with water, there must be not less than 50 pounds' pressure on the boiler. Should the boiler not be under pressure, the test may be made after draining all water from the boiler, in which case the vibration of the sheet will indicate any unsoundness. The latter test is preferable.

Flue plugs.—Flue plugs must be provided with a hole through the center not less than three-fourths inch in diameter. When one or more tubes are plugged at both ends the plugs must be tied together by means of a rod not less than five-eighths inch in diameter. Flue plugs must be removed and flues repaired at the first point where such repairs can properly be made.

Leaks under lagging.—If a serious leak develops under the lagging, an examination must be made and the leak located. If the leak is found to be due to a crack in the shell or to any other defect which may reduce safety, the boiler must be taken out of service at once, thoroughly repaired, and reported to be in satisfactory condition before it is returned to service.

The order is pretty clear. Without having had any legal advice in the matter I will say that as I understand it the railways that have filed rules have withdrawn them, and all the railways in the country will work under the set of rules which are attached to the order. In our own case we will make these rules supplement the rules of the railways for a reason which will appear later. The changes in the rules which are issued with the order, as compared with those which were handed to the Commission at the hearing, are in the arrangement of the rules in regard to the numbering of them; there are two minor changes in the wording, and one change in the arrangement, the Accident Report Rule being moved from its location in the former set of rules. None of these are, I believe, objectionable.

The order of the Commission includes copies of the report forms. It is desired that the railways print their copies of the monthly and annual reports of the identical size and the same arrangement as in the samples in order to have a similarity of reports for convenience of filing. There is no size given for the Quarterly Inspection Report or Cab Card. A number of us, however, are of the opinion that it is desirable to print it half the size of the other standard reports, which are 6 in. x 9 in., and half of that would be 4½ in. x 6 in. Some of our Chicago roads are working towards a standard card holder, so as to get it a matter of commercial manufacture in large quantities and at cheaper prices. The report also includes a Specification Card for locomotives, which will keep our mechanical engineers busy figuring out the dimensions and the strengths of present locomotives. The order concludes with a copy of the law.

Rule 12 reads as follows: "Any boiler developing cracks in the barrel shall be taken out of service at once, thoroughly repaired, and reported to be in satisfactory condition before it is returned to service."

As I would interpret that rule: These reports are our own, and we are not required to report repairs to the inspectors.

Testing Boilers: Rules 17 to 20. These rules cover the annual test, and there are a great many items in the report which have to be filled in.

The monthly and the annual forms of reports have diagrams on their backs for filling in as to defective stay-bolts, but these are only the bolts which are allowed to run; therefore, any railway which desires to have a complete record of its stay-bolts will have to maintain its present boiler inspection forms, provided such forms carry with them diagrams of the broken stay-bolts. In our own case we will retain our Rock Island form and do our work just the same as we have heretofore, supplementing it with the Government requirements.

DISCUSSION ON DESIGN, CONSTRUCTION AND INSPECTION OF LOCOMOTIVE BOILERS.

Chas. Young (P. L. W. of P.): In connection with the cab card, Mr. Seley has suggested that it be one-half the size of the monthly and annual statements. I had thought that if we made that the size of a library card, 3 in. x 5 in., it would be a convenient size for the locomotive cab, reduce the amount of stationery, and still have room for all the information required and the blanks could be filled in easily. I think the suggestion to get up a standard form of holder is a good one, too. I think that ought to be embodied as a recommendation to the Association. I would suggest that the holder, when designed, made as near dust-proof and damp-proof as possible, because the steam and the dirt in the cab of a locomotive quickly soils the sheet so that you cannot read it unless it is pretty tight at the joints. One other point, in connection with the monthly form. As I understand it the government requirement gives an option between the card form and the larger sized blanks. I believe we should have a practice recommended as to which of those the railways will place in the cab, because if the order could be made uniform it would be very desirable, I think.

J. F. Enright (D. & R. G.): It is my understanding that the quarterly card that is posted in the cab is not a sworn statement, simply a monthly report, so that if the quarterly card is adopted, and which I think by all means should be adopted for the cabs, they would be used simply with the signature of the party who took care of the gage cocks and water glasses and the inspector who looked after the boiler, so that there should be no delay to power on account of this card for the cab. The quarterly card should be used, in my opinion, but it is not a sworn statement.

F. C. Cleaver (Rutland): I ask if it is necessary to have a second card pocket in the cab for the Federal card? Does the Federal Law specifically state that this card must be exposed? It has been suggested that we could carrry two cards in one pocket. I would like some information on that subject. In New York State we have to carry a card. Now, can we have the Federal card in the pocket we already have—the pocket which has been provided for the New York State card?

D. R. MacBain (L. S. & M. S.): It is our intention in New York and Pennsylvania to put both cards in the same holder. We have it arranged now so that all these cards referring to the states of New York, Ohio and Pennsylvania shall go into one holder, and we intend to put them and the Federal card in the same holder.

J. H. Manning (D. & H.): How is Mr. MacBain going to keep the cards exposed, if he puts them all in one pocket? The law of the state of NewYork and the federal law requires them to be under glass, exposed——

Mr. MacBain: The inspector can pull the cards out and inspect them.

Mr. Manning: Will that comply with the law?

Mr. MacBain: I think so.

Mr. Manning: I would like to hear Mr. Robinson on that matter. My understanding is that the New York state law called for one pocket and the federal law called for another, and both cards should be exposed, so you can stand on the deck and read them. If I am wrong I want to find it out.

Mr. Cleaver: I looked that up carefully, and I think the federal law does not state that the card shall be read through the glass; it simply states that the card shall be under glass. Apparently, you can turn it wrong side out, as far as I understand the federal law.

E. A. Miller (N. Y. C. & St. L.): I would like to ask Mr. Seley if the stay-bolt chart shown on the back of the federal report is to be filled out in case the broken stay-bolts are replaced before the chart is made out for the government. That will make quite a difference, as to whether we should show these broken stay-bolts on this chart, or whether the showing of these stay-bolts is eliminated from the chart, except in cases where they are allowed to run in a broken condition.

The time is also getting very short within which we can put this in operation, between now and July 1, getting our blanks prepared and ready to meet that work. As I understand, the law goes into effect the first of this coming month.

M. E. Wells (W. & L. E.): I have had considerable anxiety about the same point that Mr. Miller speaks of, that is the monthly report, and I was under the impression at first that the report had to be filed in the cab every month, and I am very happy to learn that it is only the quarterly report that has to be filed in the cab—the monthly report is simply made out and forwarded to the District Inspector.

J. F. Enright (D. & R. Q.): Would it not be well for Mr. Seley to give a definition of flue plug for the benefit of the gentlemen who meet with bad water? I understand a definition was obtained from the chief inspector and others at a meeting the sub-committee had with them May 27th last.

M. H. Haig (A. T. & S. F.): I may have misunderstood something. In that first list that Mr. Seley sent out for securing information I noted a reference for cleaning out water glass cocks and gage cocks every time the boilers were washed. In some districts it is necessary to wash boilers every round trip, but I do not think it would be necessary to clean out the cocks so frequently. I would appreciate some information on that before the subject is closed.

Mr. Wells: I will say for the benefit of the gentleman, all that means is to know that they are open, which you want to know anyhow. It does not mean they shall be cleaned if they do not need cleaning. It means that you shall know that they are open and free.

R. D. Smith (B. & A.): I'm going to correct Mr. Wells. That means, and the law specifically states, that the gage cocks and water glass cocks must be cleaned, and the law goes on to state how they shall be cleaned and reported. We have not had any trouble whatever in carrying out this law, which is practically the same as the one in New York State under which we are operating. As I read this law, we will be obliged to have the certificates in the cab under glass, the same way that we now carry the certificate of the New York State inspection. It would seem to me, and I hope that some time action will be taken by this Association to that end, that it would be a good thing in some way to have the federal laws supersede the state laws.

Our round house clerks are notaries public and the inspectors go before them and make out their inspection reports, and they are sworn to and forwarded in the regular way. This is not done at one time but it is a continuous performance. It goes on daily, and it goes on at night as well as in the day time. In engine houses where we have a large number of engines the night clerks are notaries as well as the day clerks. The copy of the law did not reach my desk until just as I was leaving the office, and I am not familiar with the time which we are to be given to fill out the specification cards for boilers. Of course, those of us who have had engines running in the State of New York can get copies of those specification cards, which will make very much less work than stated by Mr. Seley is necessary, but I do not know how much time we have in which to file these cards.

D. F. Crawford (Penna.): I think we should do everything possible and in good faith, co-operating and assisting the federal inspectors and the state inspectors as far as we can. I should say for the present, put all the cards necessary in the cab, exposing them, they are put there to assist the inspector. Let him go on and see that the engine has been inspected within the proper time. I feel all here can do a great deal with the gentlemen on the various State Commissions to get them to adopt and use, or permit the use of, a Federal quarterly inspection card as covering the whole situation, the reports to be sent to the Commission as may be decided by our various Legal Departments. We have had a little experience along that line, in that the form promulgated by the Pennsylvania Commission differed slightly from the form put out by the Ohio Commission, and the Pennsylvania and Ohio reports also differed slightly from that of the New York Commission. Representatives of the three Commissions have met at some place, and have agreed that the form that we use shall be used by the Commission. The form in question reads: "This boiler has been inspected in accordance with the requirements of the States of New York, Pennsylvania and Ohio." That one form answers the purpose. I believe we could present this matter to the various State Commissions in such a form that would assist us in simplifying the work as much as possible, and I think it is distinctly up to us to co-operate with both the State and Federal Commissions to carry out this work.

Mr. Seley: As regards the size of the cab card, would say there has been nothing done definitely in this matter by us in Chicago except to consider a size one-half the size of the monthly and annual reports, which would give us a card 4½ in. x 6 in. I am advised that 4½ in. x 6 in. is not a standard paper size; 3½ in. x 5½ in. is postal size, and 3 in. x 5 in. is library size. Inasmuch as the amount of printing to be done on the card could readily be shown on one of these smaller sizes, further consideration may lead us to adopt one or the other of them. As regards the design of the car holder, would say that we have considered a pressed steel affair, that is fastened up in the cab, has guides on each side and stops at the bottom, and is open at the top. Into that is dropped another case, which holds the card, also of pressed steel, with a glass front and a couple of clips at the back, to press the card tightly against the glass, and keep the dirt and moisture out of the case.

That being dropped down into the holder makes a very neat arrangement, and if you should run in territory where you might be afraid of malicious interference and trouble with the maintenance of the card it is an easy matter to secure a piece of molding over the top of the case, so that the card could not be removed without the removal of the molding. That is a matter of detail which almost anybody can take care of. As regards the oath by the officers, I doubt very much if we can get away from the notarial requirements, as the law requires these reports to be under oath. That is really a matter for our Legal Departments rather than for us to handle.

I would strongly urge the use of the quarterly card for the cab card. It is true the rules will permit the filing of a monthly inspection report as a permissive card for operating the locomotive, but that involves a case 6 in. x 9 in. I think you will agree with me that is too large a case to put in a cab. Regarding the stay-bolt chart, would say for Mr. Miller's information that the reports state very plainly that the location of broken stay and crown bolts which were not renewed must be indicated on the diagram, so that any bolts which are renewed are not shown on the diagram. The report is to indicate the condition of the engine when it goes into service after inspection, but not what its condition was before that inspection. The condition of your stay-bolts will have to be mapped out on your own forms if you wish a complete history regarding them.

Regarding the flue plug matter, would say that I wrote to the Chief Inspector for an interpretation and I received the following reply: "Inasmuch as the rules do not prohibit the use of thimbles, I think it is a matter in which the railways must use their own discretion in regard to their use. However, I think the indiscriminate use of thimbles should be discouraged, and they should only be used when the bearing is in good condition and the thimbles are properly applied." As I understand the matter, the flue plug as stated in the rule is a plug having a hole through the center not less than ¾ in. in diameter; solid plugs are not allowed. If that hole is larger than ¾ in., reasonably larger, say 1 in. or 1¼ in., it would be construed as a thimble, but they wish to discourage the use of them to the greatest possible extent, and I think that is desirable.

The cleaning of water glasses and gage cocks is a little mixed. Rule 39 reads as follows: "The spindles of all gage cocks and water glass cocks shall be removed and cocks thoroughly cleaned of scale and sediment at least once each month." Now, if you will turn to Rule 48, which is the office record, it reads as follows: "An accurate record of all locomotive boiler washouts shall be kept in the office of the

railway company. The following information must be entered on the day the boiler is washed: (a) Number of locomotive; (b) Date of washout; (c) Signature of boiler washer or inspector; (d) Statement that spindle gage cocks and water glass cocks were removed and cocks cleaned; (e) Signature of the boiler inspector or the employee who removed the spindles and cleaned the cocks."

Inasmuch as much weight is given to getting these statements and signatures, I should be inclined to construe that every time you wash a boiler out you ought to do the other, although it says in Rule 39 "once a month," which might be answered in this way: In many sections of the country, where the water conditions are so very good, you would not wash out more than once a month. To fulfill the requirements the rule would secure the cleaning of these cocks at that same time.

As regards the filing of specification cards, I will say that we have a two-year period in which to file cards, although, if we have definite information in the office available, the rule says file them at once or as soon as you can prepare them, but there is little information, and the specification card has to be made up from an actual inspection of the boilers, and to cover a large number of old engines, we have two years from July 1. All boilers built after January 1 next must have a factor of safety of at least 4. That time was given so as to enable pending contracts to be filled and deliveries of locomotives to be made, and will give us ample time to check over and change our standard specifications and drawings so that in our new equipment after January 1 next we will have a factor of not less than 4.

The President suggests that we take up a little more time in regard to this washing-out matter. On the monthly locomotive boiler inspection and repair report question 3 reads: "Was the boiler washed and gage cock and water glass cock spindles removed and cocks cleaned?" That, of course, will be answered "Yes," or you would be violating the requirement to do it in every 30 days.

Now, as regards your office record, it should be accessible to the Government inspector and for the information of your own office force. I think the right way to do it is to clean these things and have the signatures for every washing, and then, in case anything happens, you have a clear record. You do not have to swear to that: you do not have to get any signatures other than for the purposes of your own office records.

Mr. Crawford: Inasmuch as the Federal Inspection Rules become effective July 1, and we will, therefore, not have time to refer the question of the size of this card to the Committee on Standards, I would move that the Association adopt as recommended practice, at least, the size 3 in. x 5 in., the library card size, which will enable a copy to be kept, if so desired, in your regular card catalogue file. (The motion was put and carried.)

H. T. Bentley (C. & N. W.): It seems to me a vote of thanks is in order to Mr. Seley and the Committee who had the Federal Boiler Bill in hand. They have done a tremendous amount of work. They have made trips to Washington and interviewed the Chief Inspector and his assistants; they have done very painstaking and careful work in connection with this bill, and they have also given valuable information to us individually and to the organization collectively, and I move a vote of thanks be returned to Mr. Seley and the other members of the Federal Boiler Bill Committee. (The motion was seconded and carried unanimously.)

Mr. Seley: In order that you may know to whom you have voted the thanks of the Association, I would say that my associates were the Presidents of the two Associations, also Mr. Crawford and Mr. MacBain, all of whom should share most liberally in any credit given to the Committee.

CONTOUR OF TIRES.

The committee has been instructed to give consideration to the following and make recommendations: The desirability of adopting the M. C. B. standard contour for engine-truck wheels, tender-truck wheels, driving and trailing wheels, also limit of wear of tread, shop and road limit of last turning, maximum height of flange, thickness of flange and gages. As the present standard contour for cast-iron wheels of this association is identical with the 1909 standard of the Master Car Builders' Association, it assumes that the instructions as to contour refer to steel and steel-tired wheels only.

Replies to a circular of inquiry indicate that the M. C. B. 1909 contour is being very generally used for engine-truck and tender-truck wheels. Some roads have already adopted this contour for flanged driving-wheel tires as well. The committee feels that this contour is desirable for all flanged wheels under locomotives and tenders for the same reason that it is desirable for car wheels, in addition to which is the feature of uniformity. The present A. R. M. M. A. standards call for six widths of flanged tires, and five widths of plain tires, as follows:

Flanged tires	5 in.	5¼ in.	5½ in.	5¾ in.	6 in.	6¼ in.
Plain tires	6 in.	6¼ in.	6½ in.	6¾ in.	7 in.	

Replies from the manufacturers of steel tires indicate that of the flanged tires manufactured by them, there are practically but two widths, namely, 5½ in. and 5¾ in., the large

W. C. A. Henry.

Chairman, Committee on Contour of Tires.

majority being the former. In the case of plain tires the prevailing widths manufactured are 6 in., 6½ in. and 7 in., there being little demand for the 6¼ in. and 6¾ in. widths. It is the opinion of the committee that one standard for cast-iron and one for steel and steel-tired flanged wheels, namely, the M. C. B. 1909 standards, and three widths of the present A. R. M. M. A. contour for plain tires will meet all requirements and be to the advantage of all concerned, due to the fewer number of standards.

The prevailing limit of wear of tread or channeling for all

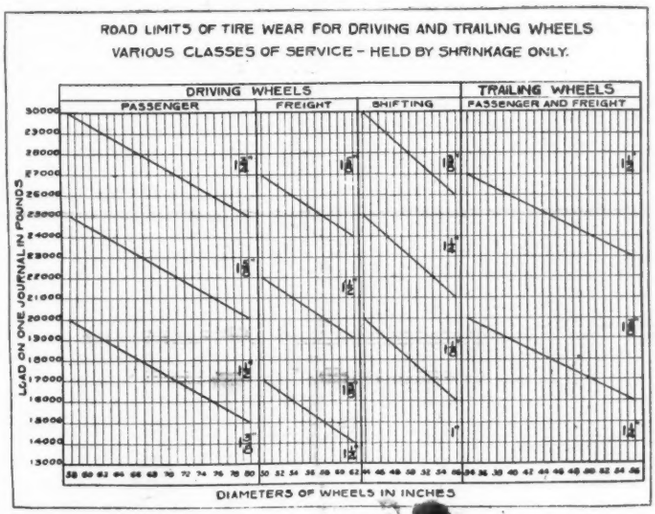

ROAD LIMITS OF TIRE WEAR FOR DRIVING AND TRAILING WHEELS
VARIOUS CLASSES OF SERVICE - HELD BY SHRINKAGE ONLY.
DRIVING WHEELS
TRAILING WHEELS
PASSENGER
FREIGHT
SHIFTING
PASSENGER AND FREIGHT
LOAD ON ONE JOURNAL IN POUNDS
DIAMETERS OF WHEELS IN INCHES

Fig. 1—Tire Wear Limits for Roads Without Severe Grades.

wheels under locomotives and tenders is ¼ in. for locomotives in road service and 5/16 in. for locomotives in shifting service, which we feel is good practice. In investigating the subject of limits of wear of driving-wheel tires the committee has found the greatest variation. After full consideration, it does not seem possible, or advisable, to establish a minimum road limit to be followed by all roads. Where long, steep grades necessitate heavy braking, or severe weather conditions result in frozen roadbed for long periods of time, tires can not be worn to the same degree of thinness

as where these conditions do not prevail. Also, the use of retaining rings, which practice, however, is not universal, has a bearing on tire thickness. After consideration of all the data available, the committee feels that the limits prescribed in Fig. 1 submitted as a portion of its recommendations will be suitable for roads not having severe grades, or extremely cold weather, and not using retaining rings. Where these conditions prevail, or retaining devices are used, such deviations will have to be made as experience indicates are desirable.

The prevailing practice is to establish the shop limit of thickness of tires ¼ in. above the road limit. This limit is strictly one of economy and not safety, and will vary with the facilities for doing the work. The M. C. B. limit for thickness of tire or rim for steel and steel-tired wheels is being generally followed in the case of engine-truck and tender-truck wheels with satisfactory results, and the committee recommends the same limits be adopted. The M. C. B. Association has already adopted a maximum height for flanges, of 1½ in. This was considered the maximum height flange that would not, in service, damage track bolts, filler blocks, etc. There is no reason why this maximum height should be deviated from. The question of gages is one in which there is practically no uniformity, each road apparently having gotten up a gage to suit its individual views. Recommendations for a shop or engine house gage on which can be read direct the important dimensions, namely, channeling of tire, height of flange and thickness of tire, are herewith submitted.

It has been suggested that the number of brackets on standard wheel circumference measure be increased from three to four and the length of the brackets increased so as to project ⅛ in. beyond the rim when the brackets are in

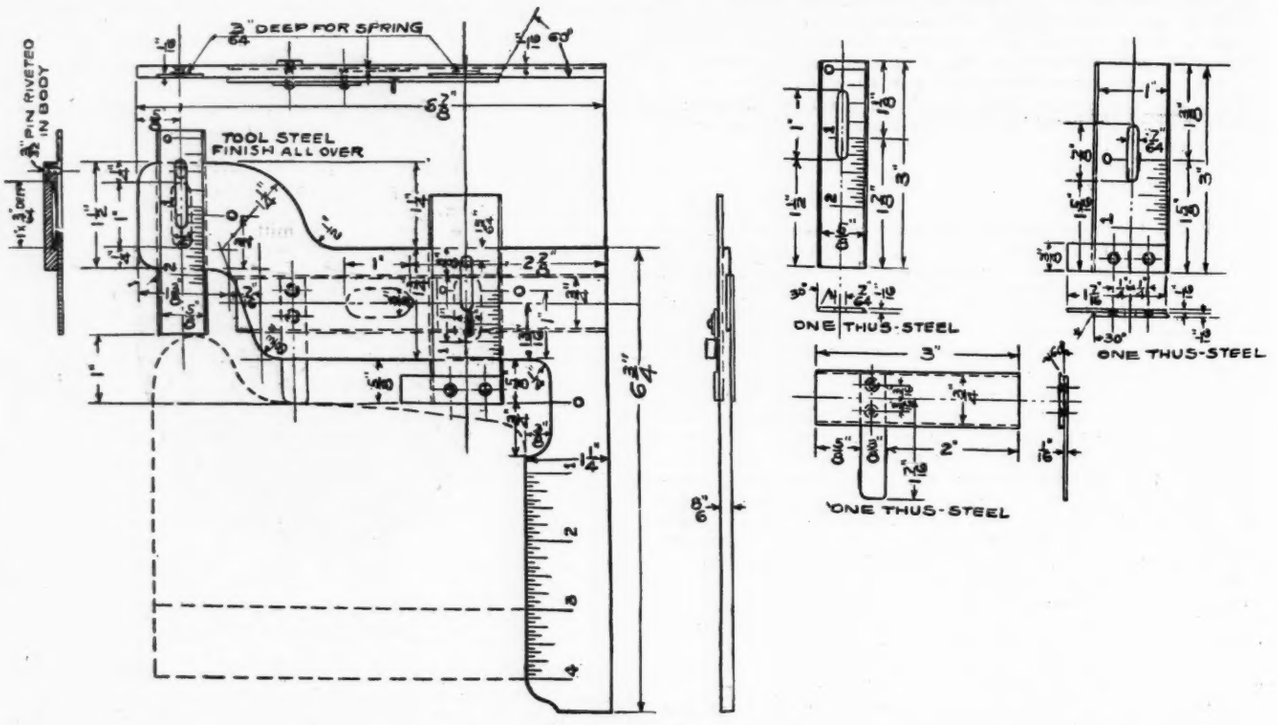


Fig. 2—Tire Gage.

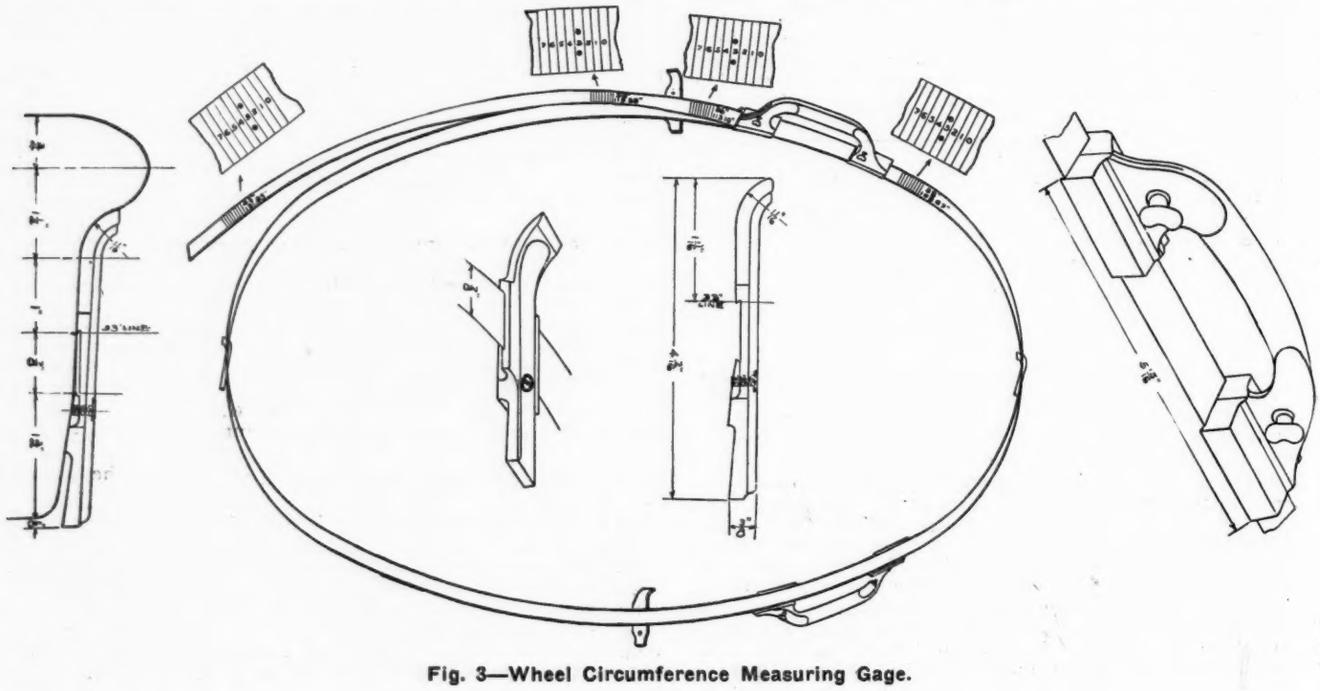


Fig. 3—Wheel Circumference Measuring Gage.

proper position. The present method of graduating the circumference measure does not provide a definite boundary for each tape size, as the tape sizes are indicated by lines.

It is, therefore, recommended that instead of defining tape sizes by lines they be defined by spaces. The committee is of the opinion that these changes in the size and number of brackets, as well as the markings of the circumference measure, all of which are shown in Fig. 3, are desirable. These same changes are among the recommendations of the standing committee on car wheels to be made to the M. C. B. Association at the 1911 meeting.

RECOMMENDATIONS.

1. The committee recommends the M. C. B. 1909 contour for all flanged steel or steel-tired wheels, as follows:
   a. Engine truck.
   b. Tender truck.
   c. Driving wheels.
   d. Trailing wheels.
2. Plain tires to be of three widths, namely, 6 in., 6½ in. and 7 in., the contour to be the same as the present standards; the widths of 6¼ in. and 6¾ in. to be eliminated.
3. Limit of wear of tread or channeling to be as follows: ¼ in. for all locomotive and tender wheels in road service; 5/16 in. for all locomotive and tender wheels in shifting service.
4. Road limit for driving and trailing wheels to be as specified in chart.
5. Road limit for steel and steel-tired wheels for engine and tender trucks to be as per the 1909 recommended practice of the M. C. B. Association.
6. Maximum flange height to be 1½ in.
7. Gage to be as per Fig. 2.
8. Wheel circumference measure to be modified as per Fig. 3.

The report is signed by:—W. C. A. Henry (Penn.), chairman; O. C. Cromwell (B. & O.), J. A. Pilcher (N. & W.), O. M. Foster (L. S. & M. S.) and A. C. Adams (N. Y. N. H. & H.).

DISCUSSION ON CONTOUR OF TIRES.

W. E. Dunham (M P. & N.): I would like to ask if any one has had any experience particularly with the 1-in. height of driving tire flange, as indicated in this contour. This is the size adopted by the M. C. B. Association for car wheels. It is quite a different proposition when you come to the driving wheel contour to take the same height of the flange.

R. W. Bell (I. C.): We are a little at sea. We have been using 1⅛-in. on our driving wheel and engine truck wheel on high-speed engines, and in fact on all engines. We would like to hear some discussion on that matter, and have some of the members who use 1-in. flange on driving wheel and engine truck wheel, particularly in high speed service, relate their experience and what success they have had in operating flanges of that height.

H. T. Bentley (C. & N. W.): I ask the members of the Association if any of them have tried ⅞-in. height of flange for switching service only. It had been recommended to us that we use ⅞-in. flange, so as to decrease the amount of wear on the trucks and increase the life of the tires, and I would ask the members of the Association if any of them have used the ⅞-in. flange for switching locomotives only.

F. F. Gaines (C. of Ga.): In reply to Mr. Bentley, will say that I have used that ⅞-in. flange for a long time on several roads, and I have never had any trouble. It gives a good flange, and it gives you a chance to wear the tires down and get more wear before it is necessary to shift them for a high flange.

R. L. Ettenger (Southern): A number of years ago, when I was with the Big 4, we tried some switch engines with ⅞-in. flanges, and they did not stay on the track very well—we had to change them. They were leaving the track a great deal of the time.

Mr. Bell: I might add that that has been our experience. With the ⅞-in. flange we could not keep the switch engines on the track, and we had to discontinue using them.

C. A. Seley (C. R. I. & P.): I really cannot make up my mind to the wisdom of adopting the same contour on these tires as is used in cast iron wheels. I am not quite sure but what the taper of cast iron wheels is excessive. With wide track it certainly contributes to derailment by reason of the different circumference. On some types of locomotives, if the tire is brought to this taper, it is going to give us some trouble. When we recently received some new Pacific type engines, there was some complaint that the engines were nosing quite a little. I abided my time and the complaints died out. I believe it was because the tires flattened by wear, shortly after they were on the road, down to their natural contour, and stopped a great deal of that nosing. The main drivers of a Pacific type engine are a pivot, to a certain extent, and I do not like to turn off all of this steel unless there is some good reason for it, and I am rather convinced that for a steel tire the taper is not desirable. Of course, it is necessary in a cast iron wheel, perhaps, to a certain extent for foundry purposes, but I am not quite sure but that we have gone too far in the M. C. B. Association.

E. W. Pratt (C. & N. W.): I was in hopes, when Mr. Seley started, that he was going a little further and would suggest that the contour of flange for steel-tired wheel might not be right when it is practically the same as a cast iron wheel. There are several flanges 15-16 in. thick after they are worn which do not break, and we do not have much experience, any of us, with broken driving wheel flanges. I believe there are a good many roads that have a minimum thickness of flange for returned tires, and it seems to me now that, if we are after that million dollars a day, we might come out publicly and state what our practice is and adopt a safe course.

Mr. Seley: I think that is a very good view of the subject, and I think that this association, as well as the M. C. B. Association, has got to adopt a different tack. I think it is generally believed that had the safety appliances as required by the M. C. B. standards been applied to the cars, that we would not have had nearly as much legislation as we have had. A good many of us talked a great deal on the floor here, but many of us went back home and did not to do what we talked about. I think the standards of this association, as well as the M. C. B Association, should be carried out, and if we cannot do these things on our railways that we are doing in the proceedings of the association we are not at all consistent. I believe that the shop practice, the road practice and the M. C. B. standards should all agree.

T. H. Curtis (L. & N.): I am glad to hear this discussion on the height of flange, but I am not ready to adopt the 1 in. height of flange for driving wheel, but I might for the tender wheels and engine truck wheels. I will adopt the 1 in. height for switch service, which we have tried and which has given good satisfaction. A word in regard to economy has been mentioned here. I will make a citation that 1⅛ in. is the condemning limit for steel tired wheels for tenders. Switch engine tenders use up a large number of wheels. In a steel tired tender wheel 1⅛ in. is not the condemning limit. For switch engine service this limit can be reduced in some cases to ⅝ in., and by running these wheels under switch engines and making special axles for them it is not necessary to buy any wheels for switch engine service on your line. A great many switch engine tenders will use the M. C. B. 4¼ in. axles, and you might buy the axles with fits as high as 7 in. and mount the wheel on these same journal axles that have a large fit. In this way you can use the tender wheels or car wheels from all your service for your switch engine tenders, and thereby make it unnecessary to purchase any wheels for that service. This has been the practice of the L. & N. for a long time and it works out well.

Robert Patterson (Grand Trunk): I am rather surprised that after the years of experience which we have had in turning the tread of tires straight that a recommendation like this should come in now. Before my time that design of turning tires was abandoned. The report does not say what benefit we are to get, from tapering, over our present practice. The only thing I can see is that it is going to make it more difficult to turn the tires; it will take longer to turn them, and they will not be turned as accurately. It will only be a short time after the engine is running on the road when the tires will come to the natural flat tread, the same as we turn them now. This practice was abandoned many years ago, and was abandoned because there was no good purpose served by having the tires turned in that manner, and I would like to know why we should go back to this practice now.

C. E. Chambers (Cent. of N. J.): I do not know where the last speaker is located—the road with which he is connected—or how many interlocking plants he has on his system, but I will say if he has as many as there are on the system with which I am connected he will see the benefit of getting the tire tapered. With the tire turned straight, without the taper, we find that there is a great deal of damage done in breaking detector points and other appliances in connection with our interlocking signal systems; and our road adopted four years ago the tapered turn on the tire to avoid interference with the wires connected with our signaling system.

O. C. Cromwell (B. & O.): I can say the railway with which I am connected turns the tire taper considerably, to what would amount to ¼ in. in the width of the tread. We have

been carrying that practice out for about eleven years. We formerly used that practice and went to the Master Mechanics' contour later. A very rapid wearing on the thread at the throat of the flange produced a rapidly reducing thin flange, and a reduction in the mileage between turnings, and after about a year's service they went back to the previous practice of turning the tread a uniform taper, which eliminated the trouble with the grooved tires accumulating so rapidly.

When you turn the full taper in the tread it starts to wear the groove in the tread well away from the throat of the flange and thereby increases the mileage between turnings. Prior to the practice of eleven or twelve years ago, at which period the Master Mechanics' contour was used, for about a year, there was a decrease in mileage. This decrease of mileage developed and was brought to our attention very noticeably by the fact that when we got after the division people for not obtaining mileage out of the locomotives they said it was due to running the tire with partially cylindrical Master Mechanics' tread, and when we went back to the full taper we got the fuller mileage as formerly. As to the height of flange, I am not much concerned about the 1 in. height of flange giving much trouble. On the road with which I am connected we had 1½ in. at one time, and concluded we would cut it down to 1-5/16 in. and then 1¼ in., and finally down to 1⅛ in., and we have not had any more trouble with it than when it was 1½ in.

H. T. Bentley (C. & N. W.): It seems to me that the tire is going to make a good deal of extra work in the shops. I am glad the subject has come up, because it has brought out a number of points the committee will want to look over a little further. To dispose of the matter I suggest that the committee be continued, and that we suggest to them that they consider some of the points which have been brought up to-day, and see if they cannot make a report which will more nearly conform to the requirements. I make that as a motion.

Mr. Pratt: Does that include further consideration of the minimum flange for return tires?

Mr. Bentley: I will embody that.

Mr. Gaines: I would also venture to suggest that the committee try to get some reports on the actual contour during the year.

Mr. Bentley: I shall be glad to embody the suggestion in my motion.

The motion was carried.

Mr. Henry: I would like to say in regard to the height of the flange that for many years 1 in. has been our standard for engine truck and tender truck, and we never had reason to believe that was in any way objectionable. It has the advantage that if you start with a short flange you can get more mileage from the wheel before it reaches the point that necessitates renewal. The height of our flanges on driving wheels of switching locomotives is 1 in., that being our standard now for a number of years, having been changed from 1⅛ in. We find that it has the same advantage as the 1 in. flange on a truck wheel. In regard to the question of the taper 1 in 20: Our experience has been that the taper gives a longer life to the flange, the tendency being for the flange to run away from the rail. We believe that that has given us more mileage. The advantage that we felt would result from tapering off the outside of the rim was to delay the time when you have an objectionable amount of generating of heat. It is true that it means a little more shop work, but I think if you actually get the cost of your extra shop work you will find that it won't be worth bothering about. We have not had any experience with 1 in. flange driving wheels on road locomotives. I understand that some roads have recently adopted them, and I am also told that they are quite general in European practice.

The President: The next subject is Steel Tires. We have not received a report on this subject, but Mr. Johnson will make a verbal report. Mr. Johnson has only been Chairman of this Committee a short time, and he has not had a full opportunity to work up on the subject.

STEEL TIRES.

The committee has been without a chairman until very lately, and consequently will give simply a report of progress. Collections of specifications already in use, and information as to the practice on the different railways in the United States, Canada and Great Britain, on the question of handling the purchase of steel tires for locomotives and cars have been collected.

Tabulated statements in conection with this material are given therewith for the information of members. It will be noticed that so far as this continent is concerned, purchasing tires by specification is the exception, whereas, in Great Britain it is the rule. Where specifications are used in America, they are used principally as guides, giving limits in analysis within which the tires should be accepted, and guarding railway companies against accepting tires with facial and contour defects, and a specification has been drawn up for your consideration which, if not entirely satisfactory to the association in its present form, will at any rate serve the purpose of bringing out a discussion and criticism of its different details, and should the committee be continued for another year, it may be possible by next convention, to place before you a specification acceptable to the members.

It is considered advisable by the committee that tires for locomotive service should be purchased in three grades, for passenger, freight and switching purposes. A physical drop test is necessary in the opinion of the committee that it is the only true way of knowing exactly what kind of material you have in your tire as it will show up the result of the working and heat treatment in the manufacture of your tires, which the chemical analysis by itself will not do. The test piece for both pulling and analysis should be taken from the tires which have undergone the drop test.

Copies of the specifications received from the different railways, at home and abroad, together with synopses of replies to our correspondence are included in the report.

The report is signed by:—Lacey R. Johnson (C. P.), chairman; J. R. Onderdonck (B. & O.); R. L. Ettinger (Southern) and M. Hogan (N. Y. C. & H. R.)

SPECIFICATIONS FOR STEEL TIRES.

1. *Material.* Steel for tires shall be made by the open-hearth or crucible process.

2. *Classes.* There will be three classes of tires for the different classes of service as follows:

Class 1. Driving tires for passenger engines.

Class 2. Driving tires for freight engines.

Class 3. Driving tires for switching engines and tires for engine-truck, tender-truck, trailer and car wheels.

3. *Chemical composition.*

Class No. 1.

Carbon, not less than	0.50 per cent.
Phosphorus, not over	0.05 per cent.
Manganese, between	0.50 and 0.80 per cent.
Sulphur, not over	0.05 per cent.

Class No. 2.

Carbon, not less than	0.65 per cent.
Phosphorus, not over	0.05 per cent.
Manganese, between	0.50 and 0.80 per cent.
Sulphur, not over	0.05 per cent.

Class No. 3.

Carbon, not less than	0.70 per cent.
Phosphorus, not over	0.05 per cent.
Manganese, between	0.50 and 0.80 per cent.
Sulphur, not over	0.05 per cent.

4. **Finish.** The tires must be free from defects of any kind and finished tires must be accurately machined to the prescribed dimensions of the Master Mechanics' Standard, and rough tires must not be outside the limits of the attached print.

5. *Branding.* The tires shall be distinctly stamped when hot with such brands as the purchaser may require, and in such a manner that these marks shall be legible when the tires are worn out.

6. *Samples for Chemical Analysis.* Drillings from a small test ingot cast with the heat or turnings from a tensile specimen or turnings from a tire (where tires are machined at the works of the manufacturer) shall be used to determine whether the chemical composition of the heat is within the limits specified in Paragraph 3.

When required, the purchaser or his representative shall be furnished an analysis of each heat from which tires are made.

7. *Physical Properties.* The steel for the different classes of service shall meet the following minimum physical requirements:

Class.	Tensile strength lbs. per sq. inch.	Elongation per cent. in 4 ins.
(a)	105,000	quotient of 1,550,000 *+ Tensile strength.
(b)	115,000	quotient of 1,300,000 + Tensile strength.
(c)	125,000	quotient of 1,150,000 + Tensile strength.

8. *Falling Weight Test.* A test tire from each heat represented shall be selected by the purchaser or his representatives, and furnished at his expense, provided it meets the requirements.

8a. The test tire shall be placed vertically under the drop in a running position on a spun foundation with an anvil of at least ten tons weight and shall be subjected to successive blows from a tup weighing 2,000 lbs., falling from heights of 10 ft., 15 ft. and 20 ft. and upwards, until the required deflection is obtained as specified in Paragraph 8b.

8b. The test tire shall stand the drop test described in Para-

graph 8a, without breaking or cracking, and shall show a minimum deflection, and it is hoped to present a formula covering this point at the next meeting.

8c. A specimen for the tensile test is to be taken from a tire that has been subjected to a falling-weight test, and it shall be cut cold from the tested tire at the point least affected by the falling-weight test. The tensile test specimen, when cut from a tire that has been subjected to a falling-weight test, shall be cut normal to the radius and parallel to the face.

8d. Should the test fire fail to meet the requirements in any particular, two more test tires shall be selected from the same heat if the manufacturer so desires, and at his expense. Should these two tires fulfill the requirements, the heat shall be accepted.

9. *Inspection.* The inspector representing the purchaser shall have free entry to the works of the manufacturer at all times while his contract is being executed. All reasonable facilities shall be afforded to the inspector by the manufacturer to satisfy him that the tires are being furnished in accordance with the specifications. All tests and inspection shall be made at the place of manufacture prior to shipment, and shall be so conducted as not to interfere unnecessarily with the operation of the mill.

DISCUSSION ON STEEL TIRES.

The President: I want to take this opportunity to personally thank Mr. Johnson for what he has accomplished in the exceedingly short time during which he has had this work in hand.

C. A. Seley (C. R. I. & P.): I am personally opposed to the destructive test if it can be avoided. It seems to me that in the matter of tires we ought to hesitate a long time before adopting, or even considering, destructive tests. While with a large order of locomotives one might be able to justify the cost of such tests, I do not believe that is true of a majority of tire purchases. A great many roads buy a limited number of sets of tires at a time; and I rather think, without going into any calculation, that it would require a pretty good sized order to justify the cost of the waste of material in a destructive test. I do not wish, however, to discourage the committee. Nevertheless, I think they ought to have this thought in mind.

G. F. Fowler (*Railway Age Gazette*): I think it well to suggest to the committee that it would be interesting to the members of the Association for the present year if they would give the reasons why they recommend three kinds of tires for three services, running it up from 50 to 70 in the three types of tires involved.

H. T. Bentley (C. & N. W.): I think if the committee can work up a specification that will enable a manufacturer to produce a tire that will not shell out under engine, tender and car service, they will confer a lasting benefit upon the members of this Association. The way in which steel tired wheels fall down in service is getting to be a serious matter. At one time we were in the habit of taking up the situation with the manufacturers and telling them, "We have some steel tires that are very badly shelled and we would like to have you look at them and make arrangements to replace them," and they were quite willing to do it; but apparently they have gotten over that disposition and gotten together now, and none of them will replace a shelly tire, and they take the position that it is the service that we give it and not the material in it that caused the tire to shell. Now, it seems to me it is up to the manufacturers to make a tire that will stand the service that we require of it. Some of the manufacturers contend that it is due to sliding. I have personally shown them tires where on one side there was a shelly condition extending for 14 to 16 in. around the tread, and where on the other side there was no indication whatever of sliding. Hence, I do not think that point is well taken, especially when the defects will penetrate a tire a depth of from ¼ in. to ⅝ in. I would like to know whether other members here have had a similar difficulty, and, if so, if they can recommend anything to overcome it.

T. H. Curtis (L. & N.): I certainly hope Mr. Johnson will answer the inquiry why the Committee recommend three kinds of tires for three services. I agree with Mr. Seley in what he has said respecting the destructive test. The Louisville & Nashville have over 900 locomotives in use and they average about 7 wheels per locomotive, and the tire breakage is practically nil. I do not think we have a tire to break once in a year. I think that is due to the climate, perhaps, because roads in colder climates have more breakage. We have purchased tires from all of the leading manufacturers, and our experience has been pretty much the same with them all.

Mr. Fowler: In answer to the suggestion of Mr. Bentley, I would say that a few years ago I had the opportunity of making some elaborate investigations in respect to steel tires. I was about two years collecting samples of tires from various parts of the country that had shelled out. I had the assistance of the New York Central, the Erie and the Pennsylvania lines in picking out tires with the idea of determining, if possible, what was the cause of the shelling. I had a large number of tires that were shelled out, and I made a very careful examination and investigation to ascertain the cause of the defect. I cut down through the shelled-out portion of the tire where the defect was very apparent, and then on the other side of the tire, and took out the best parts or pieces of the metal that I could find, and I came to the determination in all the tires that I examined that the cause of the shelling out was simply slag. These tires were picked out haphazard by the three roads that I have mentioned. I think it is a matter of clean metal which will prevent that particular shelling. There may be other causes for it, but, as I say, that was the only thing that I succeeded in finding.

F. F. Gaines (Cent. of Ga.): Lately I have run into a little difficulty, especially on the rolled solid wheel, with the flange cracking down towards the hub of the wheel. I would like to suggest to the committee that they endeavor to find some remedy for that defect. The makers claim that it is due to brake burn because of the character of the brake shoes.

The President: Have you used flange brake shoes?

Mr. Gaines: Yes; but lately we have gone to a semi-flange shoe.

The President: We had considerable trouble of that kind, and the wheel makers claimed it was due to the flange shoe. We changed to a semi-flange shoe, leaving about 1½ in. at each end, but we have had almost the same trouble. I think with a built-up wheel we have not had very much trouble with the flange cracking. We have taken the position that it is the fault of the wheel maker, not the fault of the railway. We have also taken the position in regard to showing in accord with the experience with Mr. Bentley. I think it is a question of manufacturers making a steel wheel that will stand the service regardless of what the service is, except, of coure, abuse.

Mr. Fowler: They had identically that same trouble in Brooklyn in the rapid transit service on the elevated road, using a flange shoe. There were vertical cracks down through the flange of the wheel. They came to the conclusion there that it was a manufacturer's defect, and upon carefully cutting out those wheels and looking them over critically under the microscope we discovered evidences that the trouble was caused by a heat crack due to some process in the rolling of the wheel. And that is the position that is assumed and maintained by the railway company.

Mr. Johnson: As to the destructive test, I would say that this specification was laid before the convention more for the purpose of eliciting suggestions. It was thought that it would bring forth a whole lot of discussion, and that the various details might be worked out hereafter. We felt very strongly that it was necessary to have such a test for the reason that we give in the report, namely, that it is the only true way of noting exactly what kind of material is in the tire when delivered, because it will show up the result of the working and the heat treatment in the manufacture of the tire, which a chemical analysis by itself will not do. For instance, you can take an ingot which will pass a good chemical analysis, and yet that same ingot can be destroyed by its after-treatment in the process of manufacture.

Then there was a question brought up in regard to the three different grades of tires. The reason for making that specification was not that we should have a good class of tire for one particular service and an inferior class of tire for another so much as that we could use a very much harder steel for freight service than we could for fast passenger service, and consequently get a correspondingly longer life to it. It was not that there should be any difference in the actual quality of the metal. In regard to the shelling out of tires: I suppose there is hardly a railway that has not had more or less experience of that kind, but the chemical analyses which have ben used by the Baltimore & Ohio for some years now has practically eliminated that trouble and shelled-out tires are now unknown there.

The committee was ordered to continue.

FLANGE LUBRICATION.

It has been the purpose of the committee to obtain sufficient information to determine to what extent trouble from flange wear is experienced, the lubricants and means of applying them which are in use and the effectiveness of lubrication in overcoming flange wear and its attendant evils. A circular of inquiry was issued and the committee's report is based upon the replies received from motive-power offi-

cials of about 30 railways representing widely different grade, curvature and weather conditions of operation. Among the detailed replies to the committee's circular, two only indicate that the officials represented are not having trouble in their territory from flange wear. In addition, five replies state that lubricators are being used or experimented with, which indicates trouble from this source. Eight answers, on the other hand state that the railways represented have no lubricators in use, and, unfortunately, no statements are made as to flange-wear conditions.

The Lake Shore & Michigan Southern reports having no trouble with road engines, but in some yards the wear on

M. H. Haig.

Chairman, Committee on Flange Lubrication.

driving-wheel flanges of six and ten wheel switch engines becomes a very serious matter. The Santa Fe has had the same experience with six-wheel switch engines where a large percentage of the total mileage is made on curved track. The railways reporting flange wear have curvatures reaching a maximum of six degrees or more. It would seem, however, that the mileage of curved track relative to total mileage would produce more effect on flanges than the degree of curvature alone. There are a number of other conditions affecting flange wear; among them are length of rigid wheel base, speed lateral movement and tire spacing, and the degree of stiffness of engine truck. Pacific in passenger service and consolidation in freight service are the types on which flange wear is most prevalent. However, where types are employed with longer wheel base than the

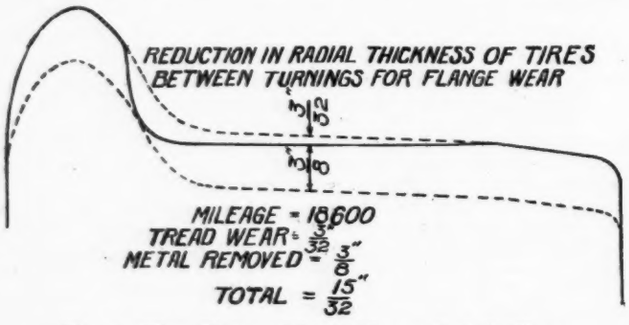

REDUCTION IN RADIAL THICKNESS OF TIRES
BETWEEN TURNINGS FOR FLANGE WEAR
MILEAGE = 18600
TREAD WEAR = 3/32"
METAL REMOVED = 3/8"
TOTAL = 15/32"

Fig. 1—Tire Wear without Flange Lubrication.

consolidation, these are reported as being subject to greatest flange wear. In general, if other conditions are equal, it is the type with longest rigid wheel base on which flange wear is greatest. There are some notable exceptions to this rule in passenger service. One division of the Pennsylvania with engines of the Pacific type in service reports greatest flange wear on those of the Atlantic type. This is also the case on the Eastern Lines of the Santa Fe System. While there is no statement to this effect, this condition may be due to the Atlantic type operating on a section of the road more severe on flanges because of excessive curvature.

There are two classes of expense due to excessive flange wear. One results from the metal lost in producing standard flanges after they have been badly worn and the other is due to the loss of revenue and the cost of repairs when necessary to turn or remove tires for flange wear between regular

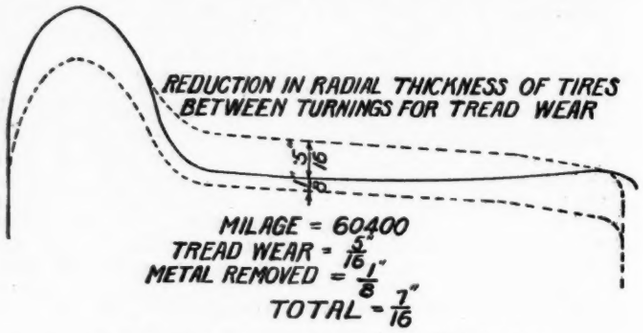

REDUCTION IN RADIAL THICKNESS OF TIRES
BETWEEN TURNINGS FOR TREAD WEAR
MILAGE = 60400
TREAD WEAR = 5/16"
METAL REMOVED = 1/8"
TOTAL = 7/16"

Fig. 2—Tire Wear with Flange Lubrication

shoppings of the engine. The figures covering metal loss have been presented according to different standards and it is, therefore, difficult to compare them. In some instances the loss has been measured in radial thickness of tires, in others by weight per turning, and in still other cases by the value of metal turned off. Where stated in radial thickness, the amount varies between ¼-in. and ¾-in. Loss in weight is stated as varying between 55 lbs. and 1,150 lbs. per engine per running, depending upon the number of wheels, and the extent of flange wear. The loss of metal expressed in terms of money value for engines of various types is given as follows: Four-wheel switch, $45; six-wheel switch, $50; standard, $50; ten-wheel, $50; consolidation, $60; Mallet, $90.

The total mileage obtained during the life of a set of tires appears to be the most satisfactory measure of tire service. On this measure as a basis, the estimate presented in Table I has been prepared to show the loss due to turning tires on account of flange wear compared with the total mileage during the life of tires when turned for tread wear. It represents the service obtained from Atlantic type locomotives operating on the Missouri Division of the Santa Fe. The mileage between tire turnings is computed from the average mileage per locomotive per month and the time between

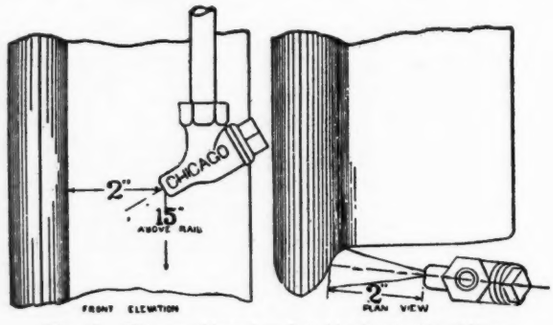


Fig. 3—Flange Nozzles for Hydrostatic Oiler.

turnings; the average mileage per locomotive per month was obtained from records of 20 locomotives over a period of eight months. Before lubricators were applied, these locomotives averaged 18,600 miles between tire turnings before reaching the limit of 1-in. vertical flange wear. Since the adoption of flange lubrication, the same locomotives average 60,400 miles between tire turnings for tread wear. Figs. 1 and 2 graphically illustrate the method of arriving at the aggregate loss given in Table I. In Fig. 2 is shown the condition of tires with 5/16-in. tread wear after making 60 400 miles. To facilitate proper turning, ⅛-in. is usually removed in the lathe. The total reduction in radial thickness between successive tire turnings will, therefore, amount to 7/16-in. Fig. 1 illustrates the condition of tires when the locomotive is shopped because of sharp flanges after making only 18,600 miles.

TABLE I.

Loss of Tire Mileage Due to Excessive Flange Wear.

4-4-2 Type, operating on Missouri Division, A. T. & S. F. Ry.:	
Mileage between turnings—Flange Wear (1/16 in. to 1 inch vertical)	18,600
Mileage between turnings—Tread Wear (1/16 in. maximum)	60,400

Flange Worn	Metal removed to build up standard flange	9/8 in.
	Tread Wear (Rate 1/16 in. per 60,400 miles)	3/32 in.
	Total reduction in radial thickness between turnings	15/32 in.
Tread Worn	Metal removed (To facilitate turning)	1/8 in.
	Tread Wear	1/16 in.
	Total reduction in radial thickness between turnings	3/16 in.

Flange Worn Tires.		Tread Worn Tires.	
Thickness of Tire.	Average Mileage.	Thickness of Tire.	Average Mileage.
New, 3½ in.	.....	New, 3½ in.	.....
After first turning, 3⅛ in.	18,600	After first turning, 3 1/16 in.	60,400
After second turning, 2 13/16 in.	18,600	After second turning, 2 7/16 in.	60,400
After third turning, 2 3/32 in.	18,600	After third turning, 2 1/16 in.	60,400
Scrap	18,600	Scrap	60,400
Estimated total	74,400	Estimated total	241,600

Total loss of mileage during life of tires..... 167,200
Loss, per cent..... 69

That this estimate may be conservative, a very liberal curve has been assumed at the throat of the worn flange. In order to reproduce the standard tire contour it is necessary to turn off 3/8-in. of metal from the tread. The total reduction in radial thickness between tire turnings is 15/32-in., which is 1/32-in. greater than the total shown in Fig. 2. Assuming a minimum thickness at the last turning of 2 in., the difference in total mileage during the life of tires under

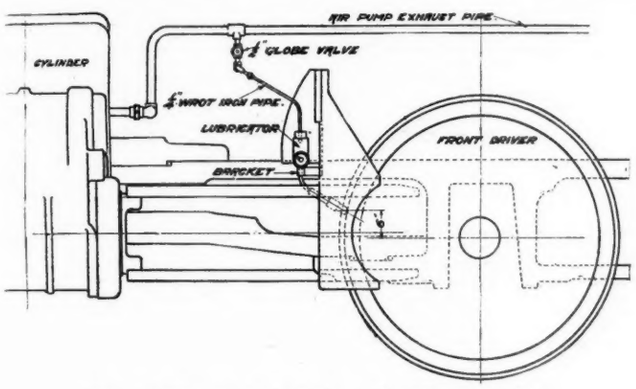


Fig. 4—Flange Lubricator; Southern Pacific.

the two sets of conditions is 167,200, a loss in tire service of 69 per cent. due to flange wear.

TABLE II.

Estimated Saving by Use of Driver Flange Lubricators on Forward Drivers of Mountain Engines, Southern Pacific.

69 Consolidation Engines.	Average Mileage per engine per month.	Total Mileage per Year.	Cost per Mile Run.	Total Cost of tire attention One Year's Service.
Before application	2491	2,062,548	$ .0097	$20,006.72
After application	2635	2,181,780	.002041	4,453.01
Estimated saving effected on mileage obtained with flange lubricators based on cost per mile before use of same	.....	2,181,780	$ .007659	$16,710.25

In some instances, where flange wear is excessive, when the front pair of tires becomes badly flange worn, it is removed and exchanged with another pair from the same locomotive. On locomotives with four pairs of drivers, two shifts may be made. But under severe conditions, it is impossible by this means alone to keep locomotives in service until the tires become tread worn. In Table II, showing the estimated saving due to the use of flange lubricators on the Southern Pacific, the average mileage per change of tires necessitated by flange wear was 8,869. The practice was to make two shifts of tires before turning. Computed on this basis, the mileage between successive turnings for flange wear is only 26,607, while tread-wear mileage obtained since the application of lubricators is 42,151.

Fourteen different forms of lubricators are now in use or have been tried by the rai'ways reporting to the committee. These may be grouped according to the kind of lubricant used into the following classes: Crude oil, engine and car oil, solid lubricant, water and exhaust steam. There are four types of lubricators designed to use asphaltum base crude oil. These are the Chicago, the Southern Pacific, the Canadian Pacific and the Rock Island. Where no other name is known that of the railway upon which the lubricator has been developed is used. The Chicago flange oiler is designed to meet the requirements of the Elliott system of lubrication, which embodies a sight-feed oiler located on the back boiler head and a delivery pipe on each side of the engine leading to the flange nozzles. The oiler is similar in general appearance and principle of operation to the sight-feed valve-chamber lubricators in general use in America. The manufacturers recommend that the nozzles be located 15 in. above the rail, 2 in. from the flange toward the outside of the tire and close in toward the tread, as shown in Fig. 3. Where two pairs of nozzles are used, each delivery pipe is branched through a "T" pipe connection. Where more than two pairs are used either two two-feed

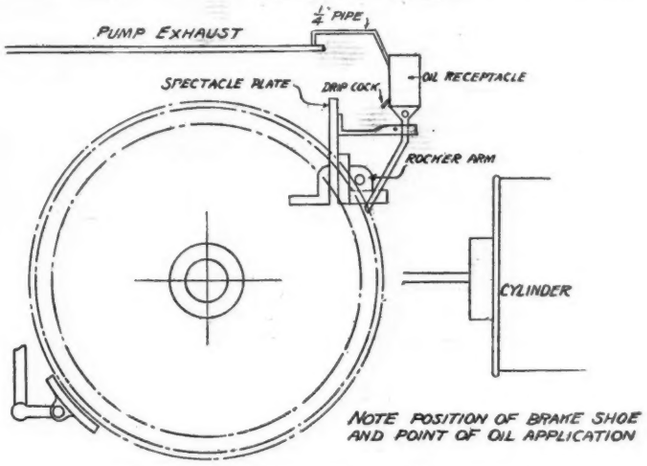


Fig. 5.—Flange Oiler; Canadian Pacific.

oilers or one four-feed oiler should be provided. The manufacturer's practice is to apply one pair of nozzles in front of forward driving wheels on road engines; one pair in front of forward drivers and one pair back of rear drivers on switch engines; on Mallet engines in road service, one pair in front of forward drivers on both engines, and in pusher service one pair in front of forward drivers of both engines and a third pair back of rear drivers on high-pressure engine.

The Wabash Pittsburgh Terminal applies nozzles to all drivers on standard type; to the front and main drivers on ten-wheel type; to the front and back drivers on the consolidation; to main and back drivers on six-wheel switch engines, and to the front and back drivers of both engines on the Mallet type. A few consolidation engine trucks are also equipped. The Lake Shore & Michigan Southern applies lubricator nozz'es to all drivers on switch engines. The practice adopted by the Santa Fe System is to apply nozzles to the rear of forward drivers where trouble is experienced from frozen sand pipes with nozzles placed in front of the drivers.

The lubricator illustrated in Fig. 4 has been developed by the Southern Pacific after experiments covering the use of a number of other methods of delivering oil to the flanges. This device consists of a steam-jacketed receptacle holding about one and one-half pints of crude oil, which is fed by gravity through a needle va've into the one-half-inch delivery pipe. A clamp bracket gripping the pipe just below the oil cup secures the oiler to the engine frame in front of the forward drivers. Loosely sliding upon the delivery pipe is a piece of one-inch pipe over the lower end of which is slipped a short section of one-inch rubber hose. The projecting end of the hose is shaped to fit the throat of the flange and acts as a shoe to distribute the oil. A weight rigidly attached to the upper end of the one-inch pipe holds the shoe against the flange at all times. The oil-cup jacket is supplied with steam from the air-pump exhaust pipe, which serves to keep the oil in a fluid state during cold weather. The drip from the jacket runs along the delivery tube, tending to prevent congealing of the oil before reaching the flange.

The Canadian Pacific, having tried hard grease and engine oil without success, is about to try crude oil in the lubricator shown in Fig. 5. This is similar to the Southern Pacific type in principle. Oil is fed through a regulating valve from the cup to the feed pipe and flange shoe, which consists of a

piece of rubber hose. Steam from the air-pump exhaust pipe passing through a coil placed within the oil cup maintains the oil in a fluid state. The Chicago, Rock Island & Pacific is using a lubricator shown in Fig. 6 on two Pacific type locomotives. The oil receptacle stands upon the running board over the right cylinder. Exhaust steam passes through a pipe leading from the exhaust cavity in the cylinder casting to the oil cup. The accumulation of condensation in the oil cup lifts the lubricant into the delivery pipe, exhaust steam carrying it to the flange. The flow of oil is controlled by the engineer through a globe valve operated by a rod extending back to the cab. A check valve placed in the pipe leading from the cylinder exhaust cavity prevents a back flow of oil through this pipe.

There are two lubricators in use employing lubricant in the solid form: the Collins and the Turnbull. The Collins is illustrated in Fig. 7. A bracket attached to the frame

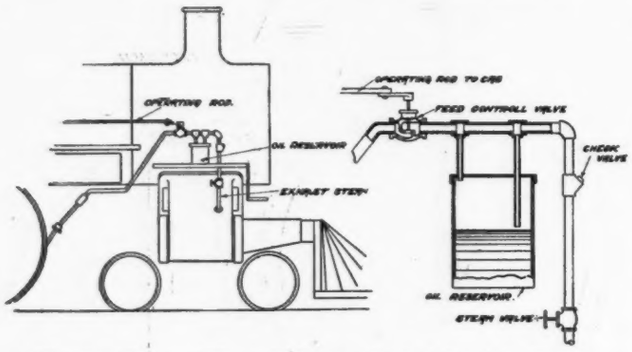


Fig. 6—Flange Oiler; Chicago, Rock Island & Pacific.

supports the lubricator in position before the driver. The angle of the lubricator is adjustable to suit conditions imposed by the location of the bracket, on which it is laterally adjustable. The angle should be as nearly as possible 25 deg. from a line parallel to the axle and it should be placed on the horizontal center line of the wheel. The location recommended by the manufacturers is shown in Fig. 7. The lubricator itself is a tube of rectangular cross-section through which slides the lubricator block of hard grease. Below this tube is a spring-feeding device designed to keep the lubricator block pressed against the flange. Pressure from a coil spring acts through a dog engaged in one of a series of notches on the under side of the lubricator block. As the lubricant becomes worn, the spring is recompressed by means of a downward projecting trigger. At the same time the dog is moved back into engagement with the next notch in the lubricator block. This periodical readjustment is the only attention required to operate the lubricator.

The Turnbull lubricator embodies the same principle, spring pressure holding a cake of hard grease against the flange. The committee is informed by the manufacturer that this device is no longer marketed and a more detailed description will, therefore, be unnecessary. The feed is automatically regulated to suit the varying needs of the flanges. On the Colorado & Southern, however, it has been found that the grease used in the Turnbull lubricator absolutely loses its merit in either wet or cold weather and its use has been abandoned. On the Canadian Pacific, Lines West, hard-greese lubrication has been found unsatisfactory. The committee is unable to state what type of lubricator was used.

Several methods of delivering engine and car oil to the flanges have been tried. The simplest is a piece of pipe or hose secured to the frame in front of the driver in such a manner as to cause the lower end to bear against the flange. The pipe or hose is filled with oil-saturated waste, which acts as a swab, more oil being supplied from time to time. Where the waste comes in contact with the tire, if packed hard, it will glaze and cease to be effective. If loosely packed, it will be drawn out and lost. Crude oil is being used in this manner on the Illinois Central to a limited extent on Pacific type engines with very little apparent benefit. It is not reliable in cold weather.

The Canadian Pacific has experimented with a siphon lubricator using engine oil, but this has proved inefficient and has been abandoned for the fuel-oil lubricator shown in Fig. 5.

Another simple device has been applied to six-wheel switch engines in the Chicago yard of the Santa Fe, and is shown in detail in Fig. 8. It is simply a block of wood resting upon the tire and grooved to fit the flange. A waste-filled cavity contains engine oil which feeds through a ⅜-in. hole to the flange. The block is loosely anchored and is usually applied to forward and back drivers. This method, however, greases the whole tire, which sometimes causes the wheel to slip.

The Chicago, Rock Island & Pacific has 10 Pacific type and 3 consolidation locomotives arranged with piping to carry water from the tank to nozzles spraying against the leading drivers. This means of lubrication is of very limited service. The pipes run horizontally along the engine frames and cause trouble by freezing during winter weather. The Pennsylvania has made use of exhaust steam from the air pump, with what success it is not known. Of the lubricators described, all are in very limited use except those using crude oil.

Flange lubrication on the Santa Fe has been developed to its present state after experiments covering the use of most of the simple devices, such as swabs of oil-saturated waste, water jets operated from the injectors and the block type shown in Fig. 8. These have all proved to be in some manner unsatisfactory. Water and engine oil have both proved too light to satisfactorily resist the action of centrifugal force, being thrown away from the throat of the flange before reaching the rail. Crude oil is now in general use for flange lubrication on the Santa Fe System

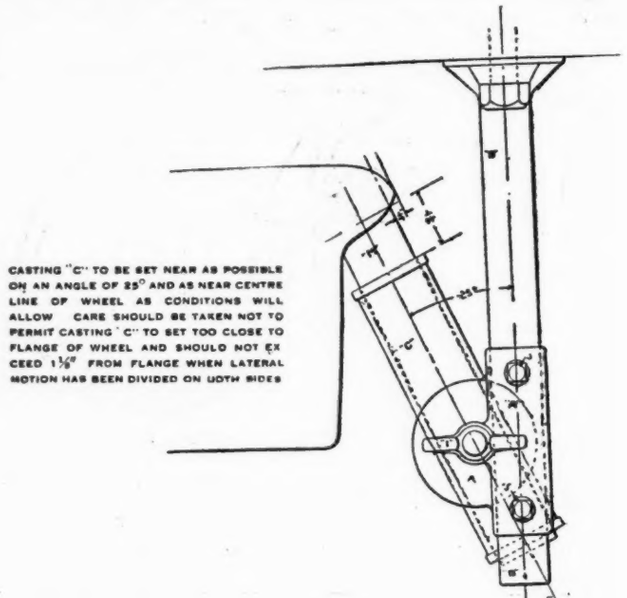

CASTING "C" TO BE SET NEAR AS POSSIBLE ON AN ANGLE OF 25° AND AS NEAR CENTRE LINE OF WHEEL AS CONDITIONS WILL ALLOW CARE SHOULD BE TAKEN NOT TO PERMIT CASTING "C" TO SET TOO CLOSE TO FLANGE OF WHEEL AND SHOULD NOT EXCEED 1½" FROM FLANGE WHEN LATERAL MOTION HAS BEEN DIVIDED ON BOTH SIDES

Fig. 7—Hard Grease Flange Lubricator.

Experience indicates that the delivery of a proper lubricant to the flange will reduce the wear of both flange and rail. The committee's information is confined largely to the results obtained by lubrication with crude oil. California crude oil contains a high percentage of petroleum asphalt. When delivered to the rail by the driving-wheel flange, it forms a thin coating of paste on the inside of the ball of the rail which does not run or spread over the top. When all engines on a division are equipped with lubricators, the rails on the outside of curves will become thus coated, and friction will be reduced on all wheels passing over the track. The resulting reduction in flange wear is noticeable on both passenger and freight car wheels, but data are available for locomotive driving wheels and tender truck wheels only. It necessarily follows that train resistance is much reduced on curves.

The block lubricator previously described (Fig. 8), applied to six-wheel switch engines, has extended the period between turning for flange wear in some cases from two months to one year.

On the New Mexico Division, a 65-mile section of which has 288 curves of 6, 8 and 19 deg., it was found impossible to keep engines of the Santa Fe type in service for more than 18,000 to 20,000 miles, but at the present time with lubricators applied they are making as high as 35,000 to 40,000 miles between shoppings with no evidence of flange cutting

On Pacific type locomotives the mileage was increased from between 25,000 and 30,000 to between 75,000 and 100,000. The performance of lubricators has been closely watched in this territory. There are instances where lubrication has not entirely stopped flange wear because of the difficulty experienced in getting engineers to give the lubricators proper attention. On the New Mexico Division, with 100 per cent. of the locomotives equipped, it has been estimated that there has been an increase of about two months in the life of rails, that previously required changing about every thirteen months. This is an increased life of 15 per cent. In territories where no figures are available, it is, however, the opinion of all officials that the flange oilers have materially decreased rail wear. The effect on wear of rails on curves has been no less marked. Where rails on 8-deg. and 10-deg. curves would last only about eight or ten months, conservative figures place the life since general application of flange oilers at about three years.

Flange lubricators on the Southern Pacific have become a necessary part of the locomotive equipment in mountain territory. When not working properly the engineers complain seriously until they are repaired. Locomotives ride easier and smoother around curves without the tendency to climb the rail which is evident when the flanges are run without lubrication.

On the Wabash Pittsburgh Terminal before the application of lubricators the average time between shopping for sharp flanges was eight months. A ten-wheel freight engine, working on a section having maximum curvature of 11 deg. 28 min., would not run three months before developing flange wear to such an extent that tires had to be turned. Since applying the lubricator this engine, working on the same section of the road, was out twenty months before shopping, when tires were turned for tread wear. Since the

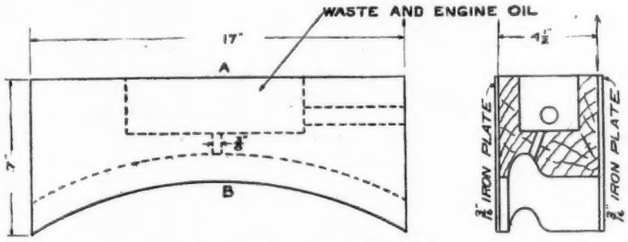


Fig. 8—Flange Lubricator; Atchison, Topeka & Santa Fe.

application to all locomotives there has been no occasion to turn tires for flange wear. It has stopped almost entirely on wheels to which the oil is delivered, and oiling the drivers materially decreases the wear on engine-truck wheel flanges. In some cases, oil has been applied to the trucks where wear was unusually excessive. Mallet locomotives showed some signs of cutting the front flanges on the low-pressure engine. By plugging the nozzles leading to the back drivers on this engine and delivering the same amount of oil that was previously used on both pairs to the front wheels, the cutting has been reduced and it has been found that the other wheels are sufficiently oiled. In addition to the direct benefit to the locomotive, there has been a decrease in the wear of switch points and rails on curves, as well as a decrease in the number of derailments. Flange wear has also been reduced on tender truck wheels.

The Atlanta, Birmingham & Atlantic has gotten as high as 50,000 miles out of locomotives that ran only 13,000 to 15,000 miles before lubrication was adopted. The average length of service for switch engines without lubricators was three or four months at twelve hours per day. Another individual case on this road shows forcibly the effect of lubrication. A ten-wheel locomotive, weighing 130,000 lbs. on drivers, in making 18,958 miles, had cut the front flanges very badly. Owing to the rush of work it was necessary to keep the engine in service if possible. A lubricator was applied and the engine again placed in service. After making 34,495 additional miles, the flanges showed no further wear. The tires were shifted and the engine again put into service. The Elliott system is in use on this railway. The cost of oil has been about 3 cents per 100 engine miles.

A service test of a yard engine was made on the Kansas City Terminal. The yard where this engine worked is so located that the front and back flanges on the left side of the engine became worn to such an extent that the engine began to climb the rail after being in service about three months. It was then necessary to change tires. The engine equipped with a flange oiler was put in service with a new set of tires and remained in service under these conditions over a period of thirteen months, when it was shopped for other repairs. The flanges were still in good condition. The results obtained were made possible by the careful attention the lubricator is reported to have received from the engineer. The foregoing instances indicate the service of flange lubrication under some of the worst conditions affecting flange wear reported to the committee.

The report is signed by:—M. H. Haig (A. T. & S. F.), chairman; T. W. Heintzelman (So. Pac.) and D. J. Redding (P. & L. E.)

After presenting this report Mr. Haig spoke as follows: The locomotives in passenger service upon which flange wear is most prevalent are the Pacific type and the consolidation. However, where types are employed with a longer wheel base than the consolidation these are reported as being subject to the greatest flange wear. In general, if other conditions are equal, it is the type with the longest rigid wheel base on which flange wear is the greatest. There are some notable exceptions to this rule, however, in passenger service. There are two classes of expense due to excessive flange wear. One results from the metal lost in producing standard flanges after they have been badly worn. The other is due to the loss of revenue and the cost of repairs when necessary to turn or remove tires between regular shoppings of the engine. There are four types of lubricators designed to use asphaltum base crude oil. These are the Chicago, the Southern Pacific, the Canadian Pacific and the Rock Island. Where no other name is known, that of the railway upon which the lubricator has been developed is used. Crude oil is now in general use for flange lubrication on the Santa Fe system. There are no data on the Santa Fe to show the exact increase in the life of rails on curves effected by the flange oilers.

DISCUSSION ON FLANGE LUBRICATORS.

T. O. Sechrist (C. N. O. & T.): Before introducing this flange lubricator on our road we would not average over 12,000 miles before we had to change tires, and after the application of the flange lubricator we got as high as 80,000 miles. We have used the Turnbull lubricator. It is made up of two solid cakes, and we could not make a trip, say, of 137 miles before the cakes would be used up. This was caused, of course, by the friction and heat that was developed. Since we have used the Chicago lubricator and asphaltum crude oil as a base, in connection with the lubricator, we have gotten over that trouble. I believe that this committee has given us the information that is necessary, for all of the railways that have adopted the flange lubricator will verify the statements made.

F. F. Gaines (Cent. of Ga.): In the past we have been very much troubled with the repeated cutting of flange. It was not due so much to curvature of the line, either. About a year and a half ago we started in experimenting by putting on a few engines the Southern Pacific type of lubricator, and we got good results so long as we followed up the engineer, but the trouble was that he did not use it always. It was a little out of the way and not handy for him to use it. With some engineers we got excellent results. We then tried the Ohio lubricator. It seems with the use of that lubricator the engineer can watch the feeding of the oil, and it is conveniently handy for him, and he is more apt to use it. Our results with it have been very good, indeed. If you take the Pacific type of engines, where we turned flanges about three times on an average we now have every reason to believe that we are going to run them right through from engine repairs to engine repairs without having to turn tires. On the consolidation engines the results are equally favorable. We have also tried the stick lubricators, but my experience with them is the same as that of Mr. Sechrist. They wear out too fast. Taking it all in all, it seems to me that some lubricator of the form of the Ohio, with crude asphaltum as a base, is the best for the purpose.

E. W. Pratt (C. & N. W.): I would like to ask Mr. Haig if his road has used any flange lubricators on trailer wheels, and with what results? Also if they have had a large enough number of their engines equipped with flange lubricators to indicate whether lubrication on the flange of the rail would decrease the flange wear on other wheels of the engine or train? Also whether there has been any slipping of the engine on curves resulting from this flange lubrication?

G. A. Hancock (St. L. & S. F.): On the Frisco system we have at present about 50 lubricators. We use crude oil asphaltum as a base. What the saving is on the flange of the tender wheels I am unable to say, but we are getting very good results from it on the engines.

Angus Sinclair: A long time ago I was running a locomotive on a very crooked road. I was responsible for the condition

of the engine and had to keep it going. It quickly developed a great deal of trouble from cutting out flanges. I never had any experience to guide me as to what was to be done, but I tried swabs—a very crude way of oiling the flanges, and then I had trouble from the wheels slipping and consequently I had to give that up. It did prevent the cutting of the flanges, however. Then I used tallow. I first tried blocks of tallow and it worked fairly well. Then I mixed it with Dixon graphite and made blocks just as hard as I could get the tallow and the graphite to hold together, and I had very good results from that. With the crude oil I should imagine there should be more or less trouble with slipping.

O. M. Foster (L. S. & M. S.): I can say that we have had very limited experience with lubricators on switch engines, but it was entirely satisfactory. Indeed, it has given more satisfaction than I have seen in the case of almost any new device.

Mr. Haig: I understood Mr. Pratt to ask if the flange oiler had been applied directly to trailer wheels. I will say that on the road where I am employed, flange oilers have not been applied direct to trailer wheels. There is every indication that the flange lubricator lengthens the life of the trailer wheels because of spreading oil on the ball of the rail. That effect is also observed under the tender, and to some extent on the wheels of the cars. The effect of slipping is not serious.

MINIMUM REQUIREMENTS FOR HEADLIGHTS.

The committee has gotten together considerable information on this subject from railways and also a great deal of data concerning tests on various headlights made at Purdue University, and some tests of a number of headlights which were made at the United States Bureau of Standards. This data is rather conflicting, and the committee would ask to be continued for another year, hoping at that time to submit a full report to the convention.

The request was granted.

CLOSING EXERCISES.

The Association passed a resolution of appreciation to all those who have contributed to the success of this Convention, as follows: To the President for his able address and the ability with which he has presided over the meetings. To the officers of the Association for the duties they have so thoroughly performed in handling the details in connection with the necessary preparations for this convention. To the Committees for the splendid reports submitted. To Prof. C. H. Benjamin, of Purdue University, for his valuable paper on Locomotive Performance under Different Degrees of Superheated Steam. To the Committee on Arrangements for its effective service in preparing plans for the meetings. To the railways for the many courtesies extended. To the American Railway Supply Men's Association for its magnificent exhibition of railway supplies that have become so important and essential a part of these conventions. To the Railway Press generally, and to the *Railway Age Gazette* especially, for the daily record of our meetings.

ELECTION OF OFFICERS.

The following officers were elected:

President, H. T. Bentley, Chicago & Northwestern.

First vice-president, D. F. Crawford, Pennsylvania Lines.

Second vice-president, T. Rumney, Erie.

Third vice-president, D. R. MacBain, Lake Shore & Michigan Southern.

Treasurer, Dr. Angus Sinclair.

Executive Committee members, C. A. Seley (C. R. I. & P.), E. W. Pratt (C. & N. W.) and J. F. Walsh (C. & O.).

D. F. Crawford: The members and the officers of this association, as well as the railways represented, owe a debt of gratitude to Mr. Fuller, our retiring president. His interest in the work of the association is probably best evidenced by the many long journeys taken by him to Washington to attend the frequent meetings of the safety appliance and boiler inspection committees, where his work and assistance have been particularly valuable. I am sure that you will all agree with me that Mr. Fuller during his term as president has rendered splendid service to the Master Mechanics' Association, and in the advancement of the mechanical science and arts. It is, therefore, with great pleasure that I move that we all rise to indicate to him our esteem and hearty thanks.

The motion was unanimously carried.

Scott H. Blewett presented Mr. Fuller the gold badge voted him.

Conventionalities.

Ask Harry Frost what grows on the trees at the entrance to the pier.

J. H. Mitchell is here, as usual. He is staying at the Brighton.

S. L. Smith arrived yesterday. It is well, for his genial smile was missed.

Among the new faces are G. W. Ristine, Jr., and J. C. Anderson, two able P. S. C. men.

J. Snowden Bell, Mrs. Bell and their daughter, Miss Marie J. Bell, are staying at the St. Charles.

D. O. Ward is here again, and Mrs. Ward and Miss Ward are with him. They are staying at the Ostend.

O. C. Gayley arrived yesterday and will remain until the close of the M. C. B. Convention. He is staying at the Marlborough-Blenheim.

Walter S. Carr, a brother of Robert F. and George R., arrived Friday. Mr. Carr is president of the Sheffield Car & Equipment Company.

J. J. Ross, who was recently appointed western railroad department manager of the U. S. Metal & Manufacturing Company, arrived on Tuesday.

Ed. Moan, master mechanic of the Southern Cotton Oil Company, formerly a red hot railway master mechanic, is here. Good luck to Ed. in the oil business.

Look out for Posty. His camera arrived yesterday and he has on a pair of sneakers. His first victim, Frank Moore, pretty nearly put Posty and his camera out of business.

Among the Pittsburghers present, we note the familiar face of J. J. Kennedy, general manager of sales of the National Tube Company. Mr. Kennedy is staying at the Chelsea.

George E. Molleson got here early. Mrs. Molleson is not with him this year. Same old trouble—difficulty in keeping servants when one leaves home, even for a few days.

H. W. McMaster, receiver and general manager of the Wabash-Pittsburgh Terminal, arrived Wednesday. Mrs. McMaster is with him and they are staying at the Marlborough-Blenheim.

W. F. Kiesel, assistant mechanical engineer of the Pennsylvania at Altoona, is stopping at the Chelsea. His son was graduated from the mechanical engineering department of Lehigh University last week.

If you want to see the long and short of it, just walk down the pier behind G. W. Seidel, superintendent of the Rock Island shops at Silvis, Ill., and Big Bill Steele of the American Locomotive Company.

H. C. Oviatt, general inspector of the New Haven, who is to play with the Eastern base ball team today, took his two boys out for practice on Thursday. He may be some player, but they have him beaten to a frazzle.

F. R. McFeatters, general manager of the Union Railway and president of the Pittsburgh Railway Club, is stopping at the St. Charles. Mr. McFeatters bids fair to make a record for efficiency as the head of the Pittsburgh Club.

W. V. S. Thorne, director of purchases of the Harriman Lines, accompanied by his assistant, Sidney Williams, arrived Thursday evening. Yesterday they made a thorough inspection of the exhibits on the pier. They will remain only a day or two.

There has been much speculation among his many friends as to why John Smythe has disfigured himself by appearing at the convention with a shining bald pate. The six feet six of genial John help to make the loss of the former 16 much cherished hairs more conspicuous.

A vigilance committee has been formed to lynch Billy Wilkinson for praying for rain. Just because one man happens to have one of London's latest creations in raincoats is no reason why the two or three thousand people who are attending these conventions should be made miserable.

Charles D. Young, assistant engineer motive power of the Pennsylvania Lines, Southwest System, one of the younger members of the association, is displaying a keen interest in the convention proceedings, and by his questions and remarks shows a thorough study of the subjects under consideration.

The rumor that the New York Stock Exchange has held trading in abeyance, pending the outcome of today's ball game, is not without foundation. Indeed, such intense interest is being manifested that the unfortunate broker who timidly inquired what would happen if it should rain was promptly expelled from the board.

Charles Maier, engine house foreman of the West Jersey & Seashore at Atlantic City, and Mr. Rettinger, the car foreman, managed to get away from their work long enough Friday afternoon to make a flying visit to the exhibits. Mr. Maier, it will be recalled, is a frequent contributor to the Shop Section of the *Railway Age Gazette.*

J. H. Painter, superintendent of the Atlantic Coast Line at Rocky Mount, N. C., has his wife with him this year. Plans are being made practically to double the capacity of his shops. He reports prospects for a large delegation of foremen from the Atlantic Coast Line for the General Foremen's convention in Chicago the latter part of July.

Captain Nellis, of the Eastern team, was overheard humming something that sounded like:

Jeffrey's record oft reminds us,
How to swat the pill intense;
And departing, leave behind us,
Splinters in the outfield fence.

Among those here who have deserted railway service for a more questionable life is Frank H. Greene. Last year at this time Mr. Greene was general purchasing agent of the New York Central Lines. Now he is king bee for Hale & Kilburn; but, as the hives of New York are more to his liking, he has decided to make his headquarters just one block, not 90 miles, from Broadway.

Prof. A. J. Wood, of Pennsylvania State College, is stopping at the Edison. Eight students are expected to enter a new course in railway mechanical engineering in this school, which is to be started next fall, and its Motive Power Club, devoted entirely to the consideration of railway mechanical subjects, had a good year. The club meets once a month and has 30 members. The college has a locomotive equipped for testing purposes and also a complete air-brake equipment. It is the only college in the east that is displaying any considerable amount of activity along railway mechanical lines.

Dave Pye is very fond of children. This fondness, coupled with Mr. Pye's enthusiastic way of expressing his admiration, put him in a peculiar light the other day. Mr. Pye was talking with some friends when a fine specimen of wholesome babyhood was being wheeled by. When Mr. Pye spied the child he broke the current of his remarks with the exclamation, "By Jove! fellows: I do like to look at a nice kid." And then a well groomed young lady who was passing in the general direction in which Mr. Pye's words had drifted turned and swept Dave with a look which meant volumes.

Consternation, admirably concealed, has reigned in the camp of the Eastern base ball team since Tuesday last. Bart Stephenson, he of "swatting" fame in last year's game at Inlet Park, wired that he would not come to Atlantic City this year, owing to the loss of his pet bat which drove out two triples and two two-baggers last year. Said pet bat, it was further explained, had been purloined during a game on the back lots of Chelsea, whither Bart had journeyed last Saturday in quest of a little needed practice for today's game. A 90-word telegram, with 90 lbs. of appeal per word, was immediately dispatched by Captain Nellis to Bart. The rumor is, that the entire police departments of Chelsea and San Saugus were turned loose in search for the missing bat; however, Bart wired yesterday a summary of a fierce back-lot battle, in which two hoodlums were prepared for the emergency hospital and the pet bat recaptured. The joyous news was received by the Eastern team during practice, Mascot Harold Oviatt accentuating it by standing on his head four minutes. Bart's bat and he have arrived and will be on exhibition at Inlet Park today at 3 P. M.

A good many people who have visited the *Railway Age Gazette* office on the pier have inquired about Miss Jennie Boyd, who for years was a member of the staff of the *Daily Railway Age* and the *Daily Railway Age Gazette* at these conventions. She is not here, and for a good reason. The reason is that she no longer is Miss Jennie Boyd; she is now Mrs. George Tebo. She left the service of this paper, was married last September and now, instead of being a business woman, is a happy and industrious little home-maker in Chicago. Mrs. Tebo in point of service—although not in age—was one of the oldest employes of the *Railway Age Gazette.* She became connected with the *Railway Age* when she was a little girl in short dresses, and stayed with it and its successor, the *Railway Age Gazette,* until she was married, almost 20 years afterward. And never did any concern have a more faithful, loyal, competent employee than she was during all those years. It was never too early in the morning for her to get down to the office, never too late at night for her to stay, if there was anything to do; and it was all done, not merely without reluctance, but gladly and enthusiastically. Miss Boyd attended these conventions for years and made numerous friends, and all of them who had not before heard of her marriage will join with those who had in wishing Mrs. Tebo many years of richly-merited happiness.

Intense interest is being shown in the progress of the two Jays, Gardner and Keegan, in their daring race to the convention. The wireless operator reports frequent calls from both voyagers, but static, due to the recent thunder showers, has interfered somewhat with the transmission. Items such as, "Sorry to have missed the reception," and, "Wish I could have made it for the dance," have been received at intervals. However, two distinct messages have reached us from Gardner's aeroplane since it left Chicago. The first gives a thrilling account of an encounter with an eagle. The second says, "Owing to fouled spark plug, broken propeller and split elevating plane, will be delayed. Expect to arrive 9 o'clock Sunday morning." Keegan's dispatches lack the detail of Gardner's, probably due to the tremendous exertion he puts in his swimming. For awhile rapid progress was reported, but when off Coney Island he ran into a shoal of mermaids. Later messages tell us that he was sighted off Long Branch with a shark and sea-serpent in hot pursuit, but that his strong crawl stroke was rapidly leaving them astern. At his present rate he may be expected at 4 a. m. tomorrow. As a mark of honor to the victor in this hair-raising race, the committee has under consideration a special net hawl at that time in order that Keegan may rise from the waves with due ceremony.

THE MASTER MECHANICS' BALL.

Photograph by George A. McKeague Co., Atlantic City, Official Photographer, Railway Age Gazette.

ELECTION OF EXECUTIVE MEMBERS, SUPPLY MANUFACTURERS' ASSOCIATION.

The election of members of the Executive Committee of the Railway Supply Manufacturers' Association resulted in the selection of members from the different districts as follows:

Third district, George N. Riley, National Tube Company, Pittsburgh, Pa.. Frank J. Lanahan, Ft. Pitt Malleable Iron Company, Pittsburgh, Pa.

Fifth district, J. Will Johnson, Pyle-National Electric Headlight Co., Chicago.

Sixth district, George L. Morton, Galena Signal Oil Company, Atlanta, Ga.

M. M. REGISTRATION.

Allan, Arthur, M. M., Temiskaming & No. Ontario Ry., North Bay Ont., Can., Traymore.
Combs, W. B., M. M., Macon, Ga., Macon, Dublin & Sav., Young's.
Emory, J. B., M. M., Kansas City Southern, Chalfonte.
Gillis, H. A., Seaside.
Harrington, H. H., M. M., Erie R. R., Penhurst.
Hedley, F. G. M., Interborough R. T. Ry. Co., Shelburne.
Jacobs Henry W., Asst. S. M. P., A., T. & S. F. Ry., Traymore.
James, E. T., Supt. Shops Lehigh Coal & Nav. Co., Dunlop.
Langton, Geo. H., M. M., Kansas City South. Ry., Dennis.
Milliken, Jas., S. M. P., Phila., Balto. & Wash. Ry., Marlborough-Blenheim.
McGill A. M., M. M., Lehigh Valley R. R., Traymore.
Noble, L. C., Dennis.
Poole, A. J., S. M. P., Seaboard Air Line Ry.
Reagan, Frank H., Supt. Scranton Shops, D., L. & W., Belville.
Robertson, D. D., M. M., Lehigh Valley R. R., Traymore.
Smock, F. A., M. M. Pennsylvania R. R.
Stewart, A. F., M. M., C. & O. Traymore.
Wardwell, H. F., Supt. Power & E., Belt Ry. Co., C. & W. I. R. R. Traymore.

M. C. B. REGISTRATION.

Boutete, H., Chief Joint Inspector, Chalfonte.
Burgman, C. P., M. M., Ann Arbor R. R.
Bussing, S. H., S. M. P., Buffalo & Susquehanna R. R. and New Orleans Gt. Northern, Haddon Hall.
Carroll, J. T., Supt. M. P., B. & O. R. R., Traymore.
Cory. C. H, Dennis.
Downing. I., S. M. C. B., L. S. & M. S. Ry., Traymore.
Gaskill, C. S, Asst. Engr., M. P., P. B. & W. R. R., Chalfont.
Gentry, T. W., Amer. Loco. Co., Wiltshire.
Gill, Wm, M. M., Iowa Central Ry., Rudolf.
Hogarth, Wm., Cudahy Refr. & Tank Lines, Brighton.
James, Edwin T., Supt. Shops, Lehigh Coal & Nav. Co., Dunlop.
Knox, W. J., M. E., Buff., Roch. & Pitts. Ry., Rudolf.
McGill, A. M., M. M., Lehigh Valley R. R., Traymore.
Martin, P. A., Supt. Equipment, National Car Lines, Traymore.
Milliken, James, S. M. P., Phila., Balto. & Wash. Ry., Marlborough-Blenheim.
Osman, H. L., S. C. D., Morris & Co. Refr. Lines, Traymore.
Peterson, A. F., M. C. B., Cold Blast Trans. Co., Haddon Hall.
Poole, A. J., S. M. P., Seaboard Air Line Ry.
Thomas, W. H., Dennis.
Reagan, F. H., Supt. of Shops, Del., L. & W., Belville.
Rommel, Geo., M. M., P. & R. Ry.
Wardwell, H. F., Supt. Power & E., Balt. Ry. Co., Traymore.

GUESTS.

Allcroft, G. E., Pur. Dept., Penna. Lines, Russell House.
Andrus, C. H., Genl. Loco. Inspector, Penna. R. R.
Barr, W. N., Ch. Clk., Gen. Mgr, P. & R. Ry., Chalfont.
Barton, E. O., Foreman Mach. Shops, P. R. R. St. Ives.
Beatty, J. B., Ch. Clk., G M. Car Dept., P. R. R., Dunlop.
Beaumont, C., M. C. B. B. C., B. & O., Young's.
Bingaman, Chas. A., Eng. of Tests, P. & R. Ry., Monticello.
Benkhart, A., Asst. Gen. Foreman, N. Y. Central, Penhurst.
Conn, J. J., Asst. Gen. Pur. Agt., Santa Fe System, Chelsea.
Casper, D. B., Gen. Storekeeper, P. R. Ry.
Davies, H. W., Pur. Agt., Norfolk & Southern Ry., Traymore.
Deeter, Harry H., Genl. Foreman, P. & R. Ry., Mullica.
Deamarest, Geo. A., C. C. to Supt. of Shops, C.R.R. of N.J., Jackson.
Douglas, F. R., Inspector Test. Dept., P. R. R.
Frazier, George H., Secy., N. E. Railroad Club, Dennis.
Gearhart, J. F., Foreman Painter, P. R. R., Dunlop.
Gehret, S. S., Gen. Fman., Penna. R. R., Hawley.
Garity, J., Foreman Machine Shop, P. R. R, Traymore.
Gosline, E. W., Foreman Pipe Dept., P. R. R.
Grant, H. H., Foreman, P. R. R., Princess.
Hall, C. B., Inspector, Pur. Dept., P. R. R.
Hines, J. P., Genl. Foreman, B. & O., Monticello.
Hubbell, C. C., Pur. Agt., D., L. & W., Marlborough-Blenheim.
Justice, H. B., Asst. Storekeeper, P. R. R.
Kidd, C. M., Genl. Air Brake Insp., N. & W. Ry.
Kline, A. J., Foreman, P. R. R.
Lewis, Thos. E., Genl. Foreman, N. & W. Ry.
Little, D. A., For., P. R. R., Rudolph.
Maddy. J. H., Special Rep.. Erie R. R., Marlborough-Blenheim.
O'Malley, G. W., Asst. Rd. For. Engines, Phila. Ter. Div.
McConnell, W. T., Frman. Erecting Shop. P. R. R., Stanley.
Marshall, T. B., Foreman, P. R. R., Chelsea Hall.
Minnett Harry, Foreman Car Insp. P. R. R.
Myers, J. E., Overseer Loco. Testing, P. R. R.
O'Brien, Jno. J., Supt. O. Dept., Terminal Ry., Watkins.
Pangborn, R. G., Mech. Engh., B. & O. R. R.
Packer, E. M., Lumber Inspector, P. R. R.
Philpot, John, Foreman Mech. Shop, N. Y. C. & H. R., Monticello.
Powell, James, Chief Draftsman, Grand Trunk Ry., Young's.
Robinson, Garland P., Asst. Chief Inspector, Interstate Commerce Committee, Haddon Hall.
Robinson, W. L, Supt. M. & W. Shop, B. & O., Haddon Hall.
Roby, E. O., Genl. Pie. Wrk Insp., N. Y. C. & H. R., Monticello.
Scheifle, John, Asst. Rd. For. of Eng., P. & R., Ariel.
Scott, J. M., Pres., Cliffside R. R., Chalfonte.
Scott, Z. D., Agt. Penn. Lines at Milwaukee, Penn. R. R., Phillips.
Sheldon, R. D., Round House Foreman P.. B. & W. Ry, Chalfonte.
Skinner. L. H., Secy. to V. P. Southern, Dennis.
Steen, W. J., Traveling Eng., P. R. R.
Stout, H. D., Storekeeper, P. R. R.
Thompson, J. G., Gen. Foreman, N. Y., O. & W., Koenig.
Wight, S. B., Pur. Agt., N. Y. C. Lines, Marlborough-Blenheim.
Wilkes. W., Elect., P. R. Ry.
Zelly, Walter, Chief Clk., P. R. R.

THE SIX KIRKSMITH SISTERS.

The entertainment planned for yesterday afternoon at the Brighton Casino proved to be one of the very best afternoon concerts ever given in connection with the conventions. The attendance was about 200 and comfortably filled the theatre.

The six Kirksmith sisters are, indeed, a very versatile group, rendering with pleasing technique and harmony both vocal and instrumental music. Every selection was thoroughly appreciated, and the continuous encoring following the rendition of each selection brought forth as many additional pieces as were provided on the original program.

The entertainment committee, in providing such a concert, has set a standard that will be hard to live up to. Every selection was just of the right length to at all times hold the audience, and the variety of combinations was likewise pleasing.

The "Six" was composed of Miss Gertrude Kirksmith, soprano and viola; Miss Maud Kirksmith, violin; Miss Lillian Kirksmith, flute; Miss Marguerite Kirksmith, cornet; Miss Pauline Kirksmith, saxophone; Miss Agnes Kirksmith, piano. The program given follows:

1. Dance of the Serpents.....*Boccalari*

INSTRUMENTAL

2. Cavatina .....*Raff*

VIOLIN SOLO

THE MASTER MECHANICS' BALL.
Photograph by George A. McKenzie Co., Atlantic City, Official Photographer, Railway Age Gazette.

3. My Lady Chlo.....*Chlough-Leiter*
VOCAL QUARTETTE
4. Traviata .....*Verdi*
FLUTE SOLO
5. Hear Me Norma.....*Bellini*
DUET FOR FLUTE AND VOICE
6. Siamese Patrol .....*Lincke*
INSTRUMENTAL
7. Hero Song from "Chocolate Soldier" .....*Strauss*
SOPRANO SOLO
8. Dixieland .....*Haines*
INSTRUMENTAL

In addition to this program, Miss Gertrude Kirksmith, by special request, repeated the "The Hero Song" from "The Chocolate Soldier." She also rendered a vocal solo, playing the violin accompaniment herself, and sang an extra solo to the flute accompaniment of her sister, Miss Lillian.

MORE GLIMPSES OF PAST CONVENTIONS.

In a way, the 1904 convention, the last held at Saratoga, was uneventful. Of course, there were the usual carriage drives, band

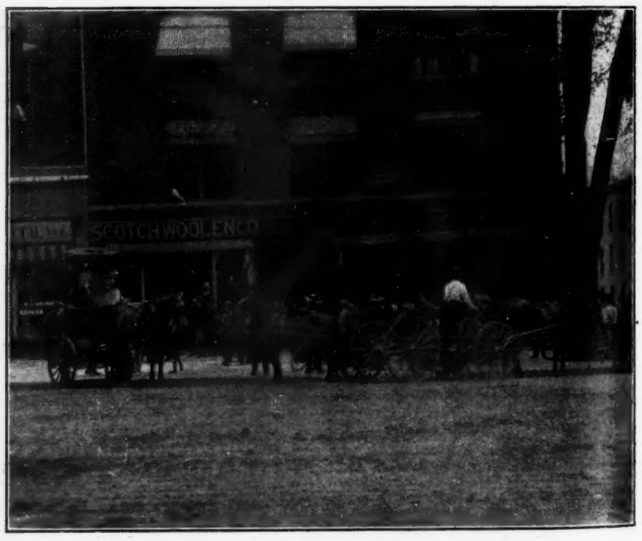
Broadway, Saratoga, 1904.

concerts (sacred and otherwise), dancing and other forms of harmless entertainment. Yes, we do recall that there was another base ball game; that the East won, and that the score stood 12 to 10. But aside from all these things (enough to make time pass pleasantly and all too quickly) some did say, "It was too slow." However, it is an even chance that the 1905 convention would have been held at the same place had the hotel owners shown the proper spirit, and had the village provided a suitable place for the exhibits, which had outgrown their old quarters. Instead, the committee selected Manhattan Beach.

Frank H. Greene and Two Pals, Saratoga, 1904.

W. T. Hippey, G. R. Henderson, G. M. Basford and W. C. Arp, Saratoga, 1904.

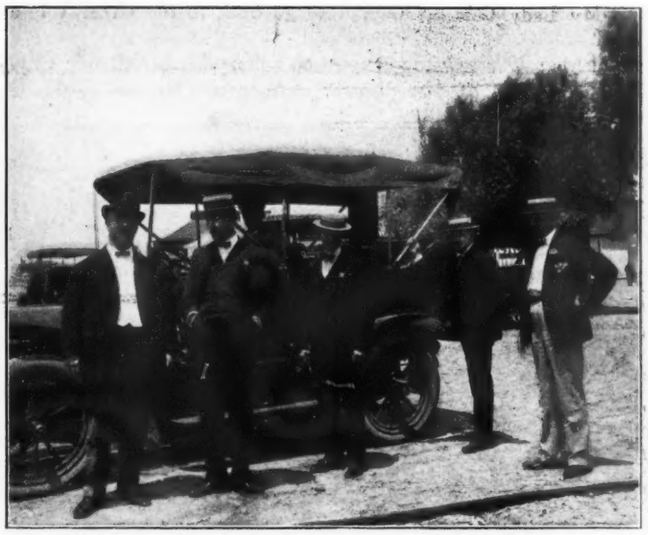
Now, Manhattan Beach was no place for a convention. It was too near Broadway. At least that is what "they" all said. And "they" were right in their prediction, but wrong in their reasoning. According to the *Daily Railway Age*, "It is as difficult to get to New York from the Oriental as from Saratoga."



Cashing in Bets on the Ball Game, Saratoga, 1904.

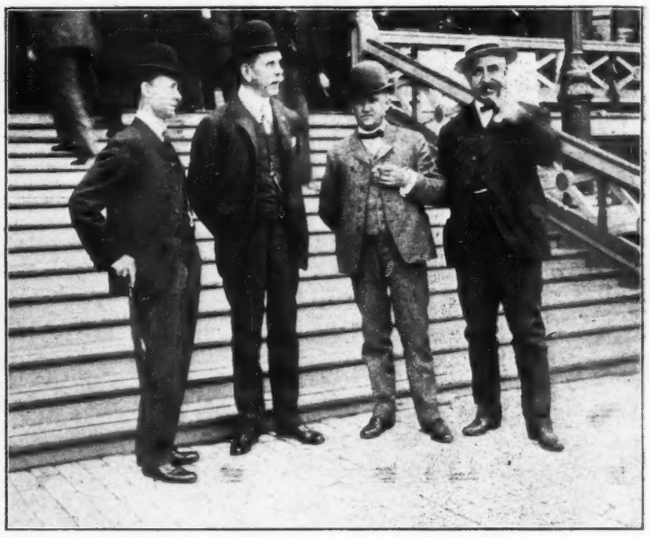
And will you ever forget the time "they" had in getting *from* Manhattan borough *to* Manhattan Beach! Those who used the one steam line found that a new signal system was being installed. We do not recall whether it was manual, or automatic, but we do remember that the number of blocks was most unusual. To those who used the Brooklyn trolley lines, one has only to mention "Sheepshead" if he would hear a tale of real woe;; and the same applies to those who chose the elevated lines to Coney Island. Perhaps it was all for the best, however; because those who finally reached the Oriental, or its companion a little further

H. F. Ball, J. F. Walsh and W. T. Simth, with C. A. Seley on the Side, Saratoga, 1904.

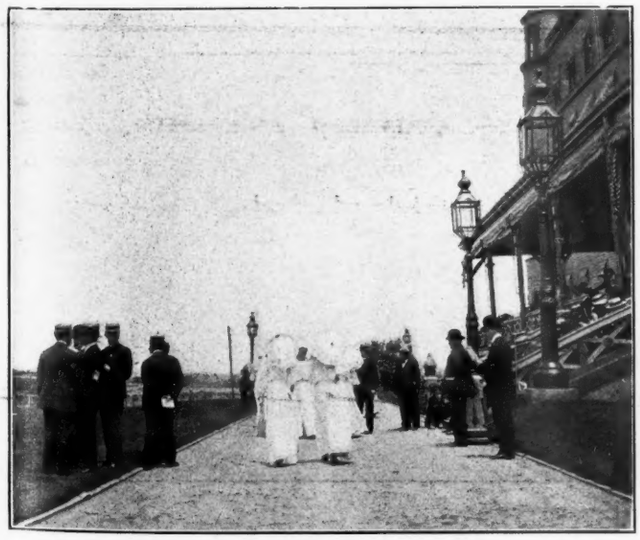


J. F. Walsh, S. N. Rushmore, R. S. Chisolm, E. A. Simmons and W. F. La Bonta, Manhattan Beach, 1905.

H. C. Macklin, E. H. Bankard and W. F. La Bonta, Manhattan Beach, 1905.



H. C. Macklin, W. H. Lewis, N. L. Friese and W. W. K. Carr, Manhattan Beach, 1905.



Rooters and Rubbernecks, Manhattan Beach, 1905.

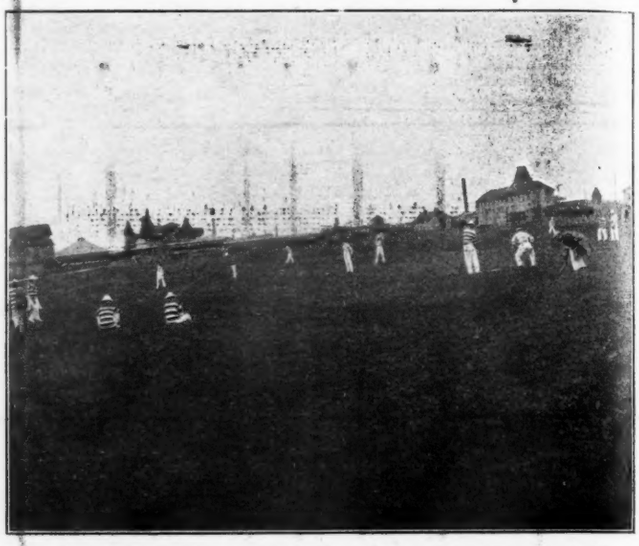
Japanese Girl Rooters, Manhattan Beach, 1905.

to the south, made no attempt to go back to the Great White Way.

The year 1906 saw the convention's first visit to Atlantic City. The predictions of dire disaster were many; but really, things went pretty smoothly, on the whole.

O. C. Gayley and L. O. Cameron, Atlantic City, 1906.

Even as sometimes before the weather man was a little backward and for a day or two the only cheerful thing on the Steel Pier was the chirp of the radiator; but after awhile his disposition was much more kindly. The report of the bureau of vital and other statistics for that year shows one important birth—the McBarmma Golf Club, named after the two mechanical associations. Clementine F. Street mothered the infant, which has since grown to healthy proportions; but the name of the father is not given. Among the suspects, however, are H. H. Vaughan, R. P. C. Sanderson, Otis H. Cutler and T. H. Symington.



On the Green, near the Oriental, Manhattan Beach, 1905.

ENTERTAINMENT COMMITTEE.

Top row (left to right)—Wardell, Furry, Miller, Martin, Coburn, Nellis, Farmer, Smith, Mitchell, Carr, Green, Toothe, Ernst, Landreth.
Bottom row (left to right)—Williams, Dunkelberg, Silk, Walsh, Hibbard, Nealley, Johnson (chairman), Hayes, Sherman, Younglove, Janes.

THE CARD PARTY.

The card party in the ballroom of the Marlborough-Blenheim last night was a very interesting and much enjoyed affair. A large number played, the games being progressive euchre and progressive bridge. Fifty prizes were awarded, 25 to ladies and 25 to gentlemen. The prizes were on exhibition in the ballroom all day yesterday, and were seen by a large number of intending players.

The committee in charge of the party was composed of J. C. Younglove, chairman; H. S. Hammond, P. J. Mitchell, Ross F. Hayes, R. C. Coburn, W. J. Walsh, George R. Carr, H. A. Nealley, C. P. Williams, C. A. Knill, J. M. Brown and Thomas Farmer, Jr.

The number of couples playing bridge was 56, and 76 couples played euchre, making a total of 264 people playing.

The following is a list of the prizes and the prize winners:

LADIES' PRIZES.

1. Mrs. G. L. Fowler (Bridge), bronze figure.
2. Mrs. Henry Boutet (Euchre), cut-glass relish dish.
3. Miss Verona Pratt (Bridge), tapestry serving tray (mahogany rim).
4. Mrs. L. J. Bordo (Euchre), copper coffee percolater.
5. Mrs. B. H. Forsyth (Bridge), cluny luncheon set, center piece and thirty-six doilies.
6. Miss M. Campion (Euchre), cavilier hand bag.
7. Mrs. Robert Tawse (Euchre), library electrolier.
8. Mrs. A. F. Stewart (Bridge), thermos carafe.
9. Mrs. W. F. Miller (Euchre), boudoir electric lamp.
10. Miss Edith Tewkesbury (Bridge), velvet band with buckle and slide.
11. Mrs. J. F. Dunn (Bridge), bracelet.
12. Mrs. C. A. Paquette (Euchre), Sheffield platter.
13. Mrs. George A. Post (Euchre), cut-glass jewel box.
14. Mrs. F. H. Scheffer (Bridge), venetian flower holder.
15. Mrs. F. A. Purdy (Euchre), mahogany candle sticks with shades.
16. Mrs. T. M. Ramsdell (Bridge), Austrian vase.
17. Mrs. A. C. Langston (Euchre), Rockwood vase.
18. Mrs. E. H. Gold (Bridge), tiplitz flower basket.
19. Mrs. W. C. DeArmond (Euchre), Dresden compote.
20. Mrs. W. S. Furry (Bridge), dessert set.
21. Mrs. F. O. Brazier (Euchre), brass fruit basket.
22. Mrs. L. R. Phillips (Bridge), parasol.
23. Mrs. G. H. Prussing (Euchre), sandwich tray (china).
24. Mrs. A. O. Chase (Bridge), rockwood vase.
25. Mrs. W. H. Hill (Euchre), sandwich tray (metal trimmed).

GENTLEMEN'S PRIZES.

1. Henry H. Kerr (Bridge), Russian leather traveling bag.
2. S. Anderson (Euchre), desk electrolier.
3. H. B. Payne (Bridge), umbrella.
4. F. O. Brazier (Euchre), electric reading lamp.
5. L. A. Williams (Bridge), cane.
6. A. G. Sandman (Euchre), terra-cotta figure.
7. H. W. McGraw (Bridge), brass smoking set.
8. A. C. Langston (Euchre), cut jet inkstand.
9. Frank Slocum (Bridge), eight-day clock.
10. H. Boutet (Euchre), Venetian cordial set.
11. F. V. Springer (Bridge), set of hangers in case
12. B. S. Johnson (Euchre), cocktail mixer.
13. Barney W. Frauenthal (Euchre), Thermos bottle.
14. H. Morley Hitchcock (Bridge), beer moat.
15. T. B. Arnold (Bridge), Bohemian cordial set.
16. George W. Rink (Euchre), adjustable shaving glass.
17. H. F. Deverell (Bridge), brass book rack.
18. E. W. Pratt (Euchre), ice tub.
19. P. J. Meade (Euchre), brass serving tray.
20. A. F. Stewart (Bridge), Doutton pitcher.
21. C. H. Rae (Euchre), brass ash tray.
22. George L. Fowler (Bridge), copper champagne cooler.
23. W. H. Wood (Bridge), necktie case (leather).
24. N. E. Sproul (Euchre), brush set.

FOREIGN RAILWAY NOTES.

Workmen in the shops of the Prussian State Railways have for some time complained of the contracts for piecework under which many of them work. Now the Minister of Railways purposes to have this matter thoroughly investigated by a commission composed of officers and employees of all grades, including representative workmen, the head of which is one of the highest officers in Berlin, and in which are four journeymen chosen by the workmen of some of the great shops, and several officials who formerly served as workmen, and so know by experience what the effects of the system are.

Three years have now elapsed since the government of the Dominican Republic assumed the full control of the Central Railroad, and each succeeding year has shown a greater profit than the preceding one. This is a most gratifying indication of the progress and sound fiscal management of the republic. According to the accounts submitted by the company for the year 1910, the total gross receipts amounted to $284,421.72; of this total, $281,517.06 were received from freight and passenger traffic. The net earning of the line for the year aggregated $73,419,40, which represents a 5½ per cent. income on the estimated value of the road, including the Santiago-Moca branch. The number of miles covered by passenger trains during the year totaled over 37,000.

The contract for the construction of the strategical railway which is to assure Turkish supremacy in the Yemen has been given to a French company. The line was designed to reach from Hodeidah to the important post of Sana by way of Hujjeilla and Menacha. By folowing this route, however, very great difficulties would have to be overcome, as a high and rugged mountain range intervenes, necessitating the use of a rack railway. Permission has been given for the line to be diverted southwards, and it will now reach Sana by a détour via Beit-el-Fakih, with a branch line to Taiz. Another important work has been allotted to the French contractors—namely, the improvement of the port of Ras-el-Ketib, 10 miles north of Hodeidah, and the construction of railways in connection therewith.

A bill was introduced in the congress of the republic of Chile during the January session for the establishment of a special savings bank and pension system for employees of the state railways. This measure, which has been approved by the senate, provides for the raising of funds for the savings bank in the following manner: 5 per cent. of the earnings of employees; fines levied on employees for the improper performance of their duties; receipts from advertisements in railway stations; unclaimed wages of employees; and 0.0015 per cent. of the receipts of the state railways. The bank is to be managed by an administrator and board of directors composed of five members, two of whom shall be the director general of railways and the administrator of the second section of the central railway system. Pensions will be granted to persons who have served the state railways 10 years or over, and who have become incapacitated for service. Employees completely disabled because of injuries sustained during the performance of duties in the employ of the state railways are entitled to a pension for life at full salary, and employees temporarily incapacitated are entitled to full salary during convalescence for a period not exceeding six months.

HIGH DEGREE SUPERHEAT.

The rapid increase in economy with a less rapid increase in the amount of superheat has been a feature in connection with the application of superheated steam which has been discussed from many angles for a long time. It is a point which is not at first apparent and which has often been discussed only from the theoretical side, and with the aid of complicated equations and mathematical calculations, which have served only to confuse the average person who has tried to study the problem. It has been shown by a large number of experimenters, including Dr. W. F. M. Goss, whose work has been of an intensely practical and reliable character, that the matter can be made clear without cumbersome mathematical demonstrations. This was forcibly shown in Dr. Goss' report of the experiments on an engine equipped with a fire-tube superheater. The experiments were conducted through a range of pressures and with varying degrees of superheat intended to cover all conditions of actual service. Taking, for example, a boiler pressure of 180 lbs., it was found that the coal per indicated horse-power when using saturated steam was 3.4 lbs. With 120 deg. of superheat the coal consumption was reduced to 3.25 lbs., showing an economy of 7.2 per cent. At 160 deg. of superheat, the coal consumption was 3 lbs., showing an economy of 14.4 per cent. It is thus seen that the increase in superheat of 40 deg. from 120 to 160 deg., gives the same increase in percentage as the first 120 deg. from saturated steam. No clearer nor more convincing fact can be shown, in proof of the claim that the economies increase more rapidly than the superheat. This shows plainly the reason for the increasing number of engines equipped with high degree superheaters.

With the fire-tube type of superheater, which has been so extensively used in this country, it is interesting to note that with the demand for increased power placed upon the engine the degree of superheat increases, and this, producing increased efficiency, results in the demand upon the boiler being increased less rapidly than the power developed by the engine. In other words, a certain increase in the horse-power, or tractive effort results in a smaller increase in the amount of fuel required. This feature is of great advantage for the reason that the capacity of the engine is increased without increasing the maximum of fuel consumption, or the labor of the fireman. On the contrary, where saturated steam is used, the efficiency of the boiler and locomotive decreases when the boiler is forced. With saturated steam the quality of the steam delivered to the cylinder is lowered as a result of the larger percentage of moisture, so that in this case when the demand for power is increased the demand for fuel is increased at a more rapid rate. Consequently the capacity of the fireman is reached before the capacity of the engine. For this reason, if no other, the superheated steam engine has a decided advantage.

FOREIGN RAILWAY NOTES.

The railway recently constructed from Corrientes, Argentina, to Dodero and General Paz has been opened to traffic, thereby affording direct freight and passenger service between Buenos Aires and General Paz.

The proposed Great Western Railway, Queensland, will consist of four sections, measuring 245 miles, 348 miles, 361 miles, and 328 miles respectively. Construction will be begun, as nearly as may be, simultaneously on all four sections. The second railway system is to run along the coast and connect up the existing railways. This line, which will be about 454 miles in length, will be constructed in five sections. In the state of Western Australia a railway with a length of about 22 miles is to be constructed to give access to the new goldfield.

The Exhibit.

George E. Molleson has been appointed general sales agent to railways for the Thomas Steel Company, Niles, Ohio.

A new line of truss brake beams for freight equipment and high speed passenger service, manufactured by the Buffalo Brake Beam Company, New York, are shown in its space on the pier.

The attractiveness of the booth of the U. S. Metal & Manufacturing Company, New York City, is due largely to E. D. Hillman, mechanical engineer of the company. Mr. Hillman has been here since Sunday.

The Independent Pneumatic Tool Company, Chicago, is showing 48 air tools and appliances of various sizes and types, and has 16 representatives to demonstrate and explain the different features. In addition to the standard line of drills and hammers, the exhibit includes several special drills of the compound type, and hammers and drills with sections removed to show the inside working parts.

While the new lantern globes are emphasized in the exhibit of the Storrs Mica Company, Owego, N. Y., the principal part of its product in the railway supply field is headlight chimneys, which have been used for the last ten years. The makers claim that these headlight chimneys help to keep the headlights in good condition by protecting the reflectors from the smoke and heat of the burner, to which they are sometimes exposed when a glass chimney becomes broken.

The Parkesburg Iron Company, Parkesburg, Pa., which occupies the same space on the pier as for the last four years, is represented at the convention by George Thomas, 3d, treasurer; L. P. Mercer, sales agent, Chicago; J. A. Kinkead, sales agent, New York; W. H. S. Bateman, sales agent, Philadelphia; Charles L. Humpton, traveling sales agent, Philadelphia; H. C. Hunter, tube expert; and J. H. Smythe, boiler expert, Parkesburg, Pa. H. A. Beale, president, was called away, but will return next week.

The representatives of the Kennicott Company, Chicago Heights, Ill., who are here are C. L. Kennicott, vice-president and general manager; C. B. Blair, assistant treasurer; T. J. Windes, salesman and chemist, water softener department; and G. E. Pratt, railway repair car department.

The following representatives of the Pressed Steel Car Company, Pittsburgh, Pa., are in attendance at this convention: O. C. Gayley, vice-president, New York; C. E. Postlethwaite, manager of sales, Pittsburgh; J. H. Mitchell, manager of sales, Chicago; J. G. Bower, assistant manager of sales, Chicago; G. T. Merwin, assistant manager of sales, St. Louis; L. O. Cameron, manager of sales, Washington, D. C.; J. S. Turner, New York; W. H. Wilkinson, New York; J. C. Anderson, New York; H. S. Hammond, Pittsburgh; M. S. Simpson, Pittsburgh; G. W. Ristine, Jr., Chicago; C. A. Lindstrom, chief engineer, Pittsburgh; B. D. Lockwood, assistant chief engineer, Pittsburgh.

The general offices of the Indian Refining Company have recently been moved from Cincinnati, Ohio, to 133 William street, New York city. Although this Company is not making an exhibit this year, it sends a cordial invitation to all its railway friends going to New York to drop in and see them at their new headquarters. Their "Indian Head" brand of lubricating oil is being furnished to railways on a mileage guarantee basis. It also manufactures valve oils made from pure Pennsylvania stock, compounded with a high grade of material. Coach and car oils are also a product in which the company deals extensively, as are also headlight oil for railway purposes, and the refining of gasolene of various gravities.

The railway department, of the International Correspondence Schools, Scranton, Pa., has brought to this convention several students from different shops where instruction is being given under its method. Of these: Letcher Vandergriff, Knoxville,

Tenn., W. H. Baldock, Knoxville, Tenn., Will T. Curlee, Spencer, N. C., Edward J. McCormick, Spencer, N. C., Garland Duckett, Atlanta, Ga., Wiley Blackwell, Atlanta, Ga., Malcolm Hankins, Birmingham, Ala., and King Holton, Birmingham, Ala., are from shops of the Southern Railway; Daniel Neal, Birmingham, Ala., and Henry Davidson, Birmingham, Ala., are from Queen & Crescent shops; S. D. Sprouse, Mobile, Ala., and J. D. Lang, Mobile, Ala., are from Mobile & Ohio shops; S. E. Purdun Yoakum, Tex., and W. L. Dornberger, Yoakum, Tex., are from S. A. & A. P. Ry. shops; and Murray Dixon, Toronto, Can., and Allen Norman, Toronto, Can., are from the shops of the Canadian Pacific.

The T. H. Symington Company, Baltimore, Md., is exhibiting an M. C. B. slotted butt coupler as adopted in 1910 by the M. C. B. Association and subsequently made standard by Letter Ballot. A portion of the top wall of the coupler shank is cut away to show the M. C. B. reinforcement of the standard key slot and the proper length of bearing for the key at the front and back ends of the slot. The slotted butt couplers are suitable either for the riveted yoke or a key connected draft gear attachment. The shank of the slotted butt coupler is stronger through the slot in tension, compression and flexure than it is between the slot and the coupler head. Slotted 8½-in. and 9⅛-in. butt couplers may also be used with the riveted yoke, thus reducing the number of couplers and stock on hand necessary to carry out outlying car repair points.

METAL CAR SPECIALTIES.

Forsyth Brothers Company, Chicago, has built an extensive and modern plant at Harvey, Ill. This company is constantly adding to the number of pressed metal specialties, many of which it has already gotten into extensive service. Among others of these metal formations might be mentioned the pressed unit side sections, doyle posts, carlines, pressed steel roof sections, one-piece metal doors, self-adjusting dust-proof window sash and sash weather-stripping. This company a'so manufactures, in its other departments, draft gears and buffing devices.

IMPROVED NATIONAL LOCK WASHER.

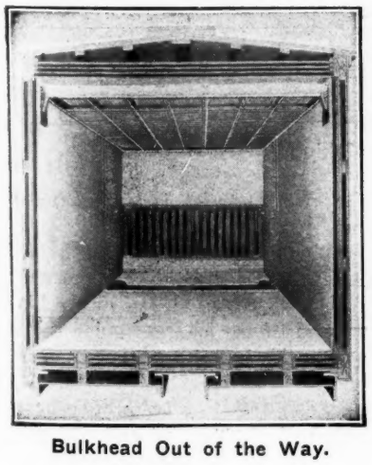
At space 4 in the main building, the National Lock Washer Company, Newark, N. J., is exhibiting a full line of its lock washers, from 3/16 in. to 4 in. in size. This company has been making nut locks for 25 years. All the steels used are special in every sense of the word, and must pass exacting analytical and physical tests before acceptance. The machines used in tempering and hardening the nut locks are of special design, fully protected by patents owned by the company. There is no part of the treatment left to the judgment of the employee. The whole operation is automatic from the original winding of the nut lock until the final testing. The fact that over 500,000,000 National lock washers have been used to advantage in track has convinced railways that they can be used to equal advantage on car work; and many roads have made this practice standard. The principal claim made for the National lock washer is that it is the only nut lock which, by reason of its rib, causes a lock between nut and bolt independent of spring power, and at the same time acts as an elastic bond between nut and backing, retaining a tight joint even if the bolt stretches or the bearing surfaces be rough or uneven.

LOW WATER ALARM.

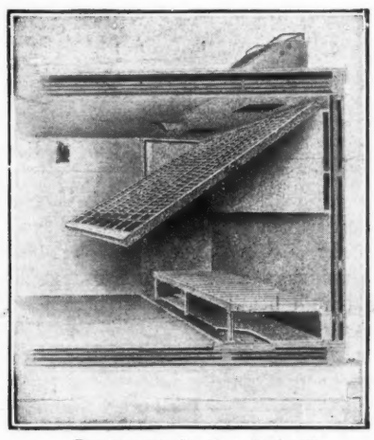
The Kellogg low water alarm automaticaly signals to the engineman in case the water level in the boiler sinks below the desired and permissible safety limit. It consists of a tube filled with mercury and placed in a metallic casing, which connects with the water space of the boiler at a point below which the water level should not sink. As long as the casing is submerged in water, the mercury in the tube will exercise no function; but when the water level sinks below the safety limit and steam enters the casing, the mercury will be heated and the force of the expansion will automatically open a valve, admitting steam to a whistle which sounds the alarm. The connection with the water space of the boiler may be so made that the level of the water above the crown sheet can be predetermined at any height desired. The Kellogg alarm is made by the Nathan Manufacturing Company, New York.

GALVANIZED PRESSED STEEL BULKHEAD.

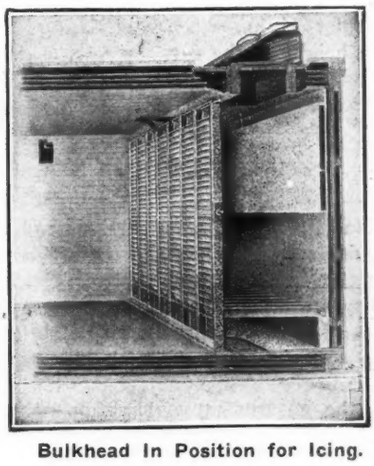
The White Enamel Refrigerator Company, St. Paul, Minn., has made an improvement in its bulkhead material for refrigerator cars that reduces the weight of the car by 600 lbs. Instead of the wooden construction usually applied to this class of equipment, it has perfected a galvanized pressed steel bulkhead that does away with wooden posts, wooden protection strips, and screens. The Bohn system of refrigeration is doubtless used to a greater extent for both car and stationary purposes than any other one arrangement. It has been in use for years upon such roads as the Harriman Lines, the Atchison, Topeka & Santa Fe, the Chicago, Burlington & Quincy, the Chicago Great Western, and the Canadian Pacific. A contract recently awarded this company calls for Bohn refrigerators for the Grand Trunk Railway hotel, the Chauteau Laurier, and Central Union Station, Ottawa, Canada. A feature of the bulkhead is that when the car is not in use it folds up under the roof and out of the way. The accompanying illustrations show the bulkhead in its positions.



Bulkhead Out of the Way.



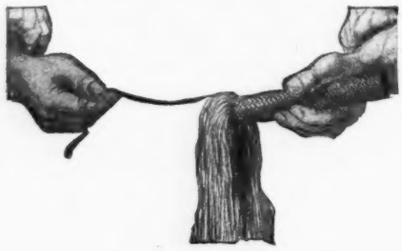
Bulkhead Partly Raised.



Bulkhead In Position for Icing.

PALMETTO PACKING.

Greene, Tweed & Company, New York, are showing, in booth 606, the Palmetto packing. The accompanying illustration shows this packing, as made up of many strands braided together. The strands are asbestos and are well

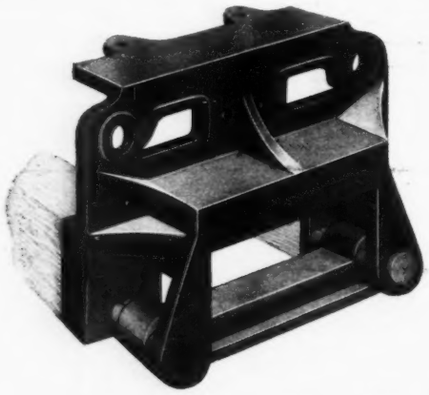


Palmetto Packing.

saturated with lubricant before braiding. This keeps the packing soft and pliable in service, which prevents it from scoring or binding the rod. This packing is furnished in forms suited to air pumps, throttle valves, Walschaert's valve gears, shop engines and compressors, as well as small hand valves, etc.

COMMONWEALTH-FLORY STRIKING PLATE AND CARRY IRON.

The Commonwealth-Flory striking plate and carry iron is made by the Commonwealth Steel Company, St. Louis, Mo. Attention is called to the fact that it meets a new emergency



Commonwealth-Flory Striking Plate and Carry Iron.

in its ability to secure any required end clearance. The carry iron is reversible, and turning it over raises a drooping coupler ¾ in., thereby obviating the necessity of altering the height of the car. In this, as well as in the time saved in changing couplers and attachments, a large item of expense is eliminated.

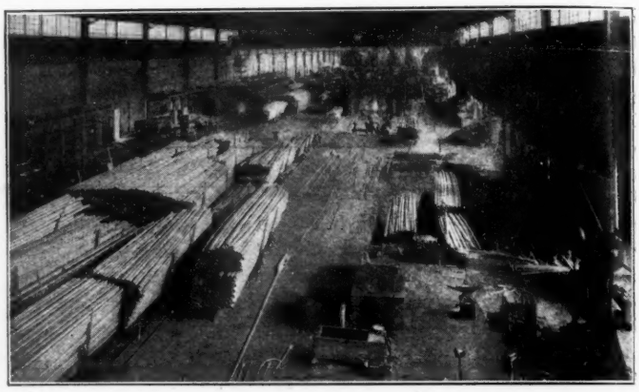
RADIATORS FOR STATION HEATING.

Radiators of different designs and construction, which give a wide range of choice to the architect or engineer, are made by the United States Radiator Corporation, Dunkirk, N. Y. They are designed with the purpose of giving a high heating value for every square inch of surface, the outer barrels of the sections being made to give as large a surface as possible to the outside air. The Triton radiator has been adopted by the government for heating many public buildings.

Among the different types made by this company are the Triton Plain, the Triton Ornamental, the Puritan Plain, the Florentine Ornamental, the Grecian Plain and the Sun Ornamental.

CHARCOAL IRON FOR TUBES.

The Parkesburg Iron Company, Parkesburg, Pa., formerly H. A. Beale & Co., has been in continuous operation for about 50 years, its output of blooms being converted into charcoal iron boiler tubes. For a number of years, in addition to skelp from charcoal iron blooms, puddled iron skelp was also produced at this mill. This latter material made a very durable tube, but as it is not as ductile as charcoal



Tube Mill; Parkesburg Iron Company.

iron, it gradually fell into disfavor, and to-day the output is exclusively charcoal iron skelp, which since 1908 has been manufactured into tubes at Parkesburg, in an electrically driven tube mill, an interior view of which is shown herewith. This company's output has increased from less than 1,000 tons of blooms per year, at the beginning, to 18,000 tons of tubes annually. The accompanying illustration represents one of the 26 forge fires at Parkesburg, where each fire produces a loup of iron of about 240 lbs. in the neighbor-

Forge for Making Charcoal Iron.

hood of 45 minutes. The raw material is either run-out metal, of charcoal pig iron from which the graphitic carbon and silicon have been eliminated, or clean steel or iron scrap, the refining process in both cases being the same, namely; to melt the charge in a charcoal fire under blast. By this operation, all particles of the charge under the reducing flame are melted and purified, making a homogeneous loup of nearly pure iron in the bottom of the hearth. It is claimed that the resulting cinder, as in the basic open hearth furnace, reduces the sulphur and phosphorus and eliminates

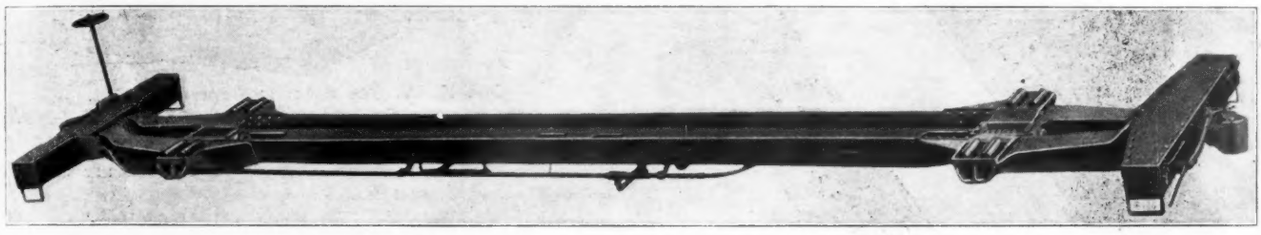
the carbon and manganese from the charged material, the total iron being 99.7 per cent., or higher, in the bloom. This process produces a ductile material, which is converted into boiler tubes.

LITTLE GIANT DRILLS.

The Chicago Pneumatic Tool Company, Chicago, has on exhibition one of its No. 10 Little Giant drills fitted with pistol grip handle. This is the smallest piston air drill ever placed on the market; the complete machine weighing but 6¾ lbs. It was especially designed for drilling telltale holes in stays. The pistol grip handle is patterned after the handle on Boyer hammers. The throttle lever is operated by the thumb which renders speed control perfect.

BETTENDORF TANK CAR.

The accompanying illustration shows a tank car made and designed by the Bettendorf Axle Company, Davenport, Iowa, to eliminate as far as possible the damage done to tank cars by the liquid surging when the cars are being coupled.



Underframe for Bettendorf Tank Car.

The underframe consists of a center sill or buffing column, to which is riveted the body transom and draft sills, made in one piece. Above the side bearings are located horizontal rollers arranged in roller seats with inclined surfaces, and on which corresponding seats, secured to the tank, may travel. A special designed buffing device is provided above the center plate to assist in eliminating the horizontal travel of the tank over the underframe. A special locking device is also provided at this point to anchor the tank to the underframe. Thus it will be observed that in coupling cars the underframe will be the first to stop, and the tank, with its load, in which is stored a great amount of energy, due to its load and the speed at which the car is traveling at the instant of impact, is free to travel further, but in an inclined direction, bringing the tank to rest with its own weight, and dissipating the force of the blow in an upward direction.

An interesting test report is given herewith, in which the tank car was run at various speeds, hitting a loaded high capacity gondola car with brakes set, showing the movement of the tank over the underframe.

TANK EMPTY

Weight of Car 48,000 *lbs.*

M.P.H.	Velocity Feet per Second	Momentum Foot Pounds	Horizontal Travel Inches	Vertical Travel Inches	Recoil Inches
4	5.37	281,760	1 5-16	⅓	¼
6	8.8	442,400	3⅜	1 5-16	⅝
8	11.73	565,040	4	1½	15-16
10	14.66	703,630	4 5-16	1¾	1⅛

TANK FULL

Weight of Car and Load 154,250 *lbs.*

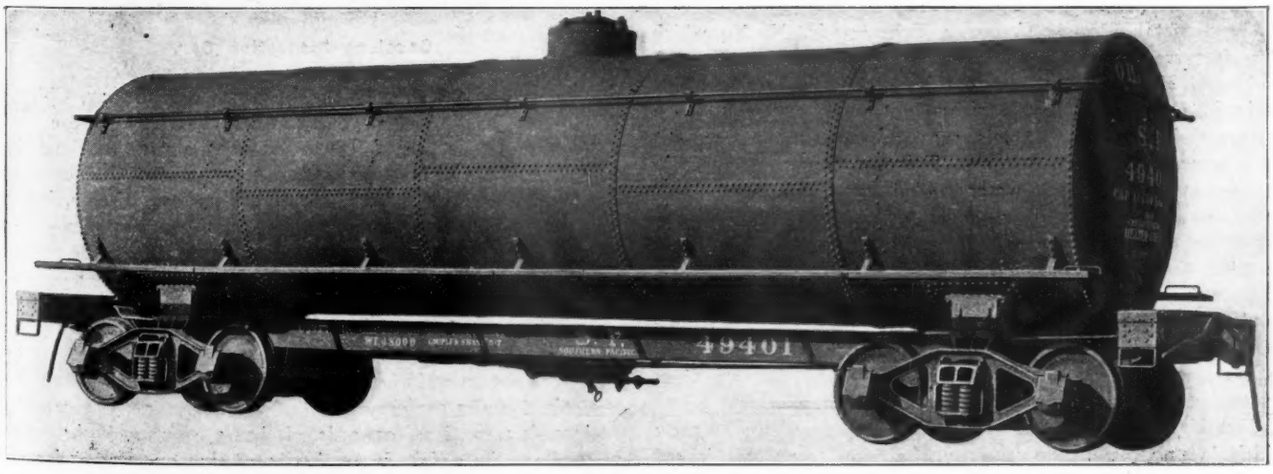
4	5.37	905,447	1 3-16	7-16	⅛
6	8.8	357,400	3⅛	1¼	¼
8	11.73	1,809,352	3¾	1½	⅝
10	14.66	2,261,305	4 5-16	1¾	½

AUTOMATIC TONGUE LIFT AND BRAKE FOR BAGGAGE TRUCKS.

The Railway Appliances Company, Chicago, is showing a model of an automatic tongue lift and truck brake. It is an arrangement which, as soon as the handle of the truck is dropped, instead of falling to the ground it is raised upward and at the same time applies brakes to the truck wheels. This stops the movement of the truck, eliminates the danger of persons stumbling over the truck handle and prevents the trucks from being driven off the platforms by gravity or wind. This last feature is imporant, as railway and express companies have suffered considerable loss by such accidents.

VALVE GEAR STOCK.

Anything that can be done on a railway to reduce unnecessary stock is a benefit to the road; it not only reduces the amount of money tied up, but also reduces the possibility of running out of any one material. It is quiet a problem in the motive power department to tell just what forgings and castings are necessary in order to maintain the engines.



Bettendorf Tank Car.

The different engines vary quite a good deal in construction and it is impractical to carry some of all the different parts in stock.

Locomotive valve gear has been standardized by the Pilliod Company, New York, makers of the Baker valve gear, so that the same gear parts are used on the different types and classes of engines. These gear parts, barring wrecks, would last indefinitely, they being designed so that the bearings can be renewed without the renewal of the piece itself. Even the matter of rights and lefts has been reduced to the minimum. These parts can be applied to any of the engines.

GALCO FOR INTERIOR FINISH.

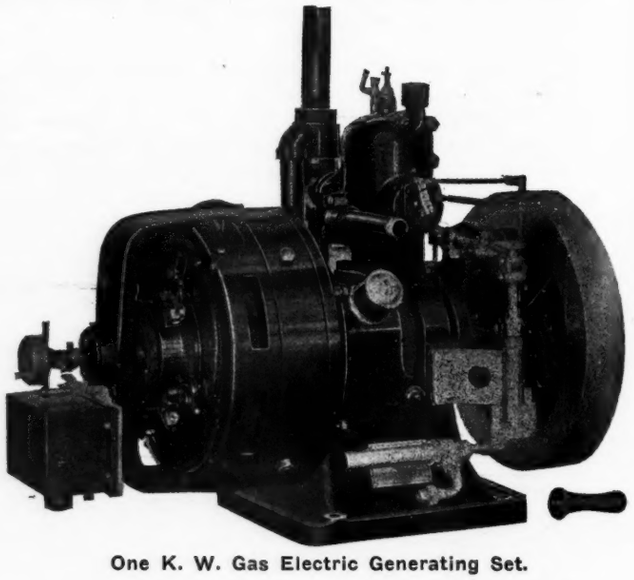
The United States Metal & Manufacturing Company, New York, is showing in booth 337 material and samples of Galco for interior finish. This material can be used generally for interior finish throughout a car body; it will take a high finish and can be made to imitate various kinds of wood, especially mahogany and oak. It can be smoothed with a

Galco for Interior Finish.

steel scraper or knife and is treated the same as natural wood. It is claimed by the makers that Galco overcomes the many troubles encountered with veneered head-linings, peeling and cracking, and being destroyed from leaky car roofs; that when painted, it becomes waterproof and can be soaked for a week with no disintegration and gets harder, like whalebone, with age; that it is a good non-conductor of heat and, to a great extent, electricity; and that, when subjected to 200 deg. of dry heat for a period of four to six minutes, it may be warped into any desired shape while in the heated condition without any fracture to the surface of the material.

GAS ELECTRIC GENERATING SET.

The General Electric Company, Schenectady, N. Y., which manufactures gasolene electric generating sets of capacities 3, 5, 10 and 25 kw., has added to this line a 1-kw. set which is designed for furnishing electricity for power and lighting in private residences, small hotels, rural railway stations, etc., not now served by central stations. This set comprises a single cylinder, vertical, 2-cycle water cooled gasolene engine direct connected to a 1-kw. d. c. generator. The regulation and steadiness of the voltage of this set is such that current may be taken direct from the generator, thus avoiding the expense of installing and maintaining a large battery and the losses and troubles incidental to the operation of the latter. The engine is provided with a suction gasolene pump for lifting fuel from a tank placed under ground and located at some distance from the engine, thus fulfilling the requirements of the National Board of Fire Underwriters. The cooling is done by a thermo siphon which does away with the necessity of a pump to provide forced circulation of the cooling water. The governor is located in the engine fly wheel and operates a throttle valve, giving close regulation and satisfactory operation at all loads. The dimensions of this 1-kw. set are: Length, 2 ft. 6⅝ in.; height, 2 ft. 2 in.; and width, 17⅝ in.; and the total weight is 350 lbs.

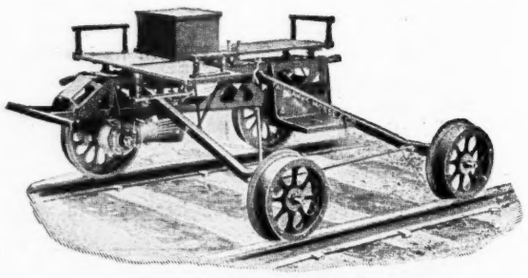


One K. W. Gas Electric Generating Set.

These sets can be furnished with either 35, 75 or 125 volt flat compound wound generators. Switchboard panels are furnished for controlling these sets.

GASOLENE INSPECTION CAR.

Gasolene cars are rapidly coming into extended use on railways. We now have the gasolene passenger car, gasolene inspection car, gasolene section car, and the velocipede type of gasolene car for roadmasters, signal and telegraph service. Following the general trend of improvements made from time to time, the builders of gasolene cars are now using steel very extensively and produce cars entirely of steel. The latest pro-



Gasolene Inspection Car.

duction is one made by Fairbanks-Morse & Company, Chicago, and known as their No. 28 car, which has been in use on a number of the leading railways for enough time to show that it is up-to-date in both design and construction.

Some of the principal features of this car are: Frame, framed from one piece of pressed sheet steel; guide arms, square steel tubing; and power, two cylinder, two-cycle, air-cooled engine, direct connected to the front wheel. The engine has no valves, cams, pawls, springs, in fact, scarcely anything to get out of order. The crank-cases are enclosed and absolutely dust-proof. For lubrication, oil is mixed with gasolene and hard grease cups are used on main bearings. Speed of from six to 30 m. p. h. is attained under perfect control of the operator. The car runs backwards as well as forwards. It has a capacity of three people and yet the weight is so distributed that one man can easily handle it on and off the track.